MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe.

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INTRODUCTION.

The Review for June, 1896, is based on 2,690 reports from stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,363 from voluntary observers; 34 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 14 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The Weather Review is prepared under the general editorial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

CLIMATOLOGY OF THE MONTH.

GENERAL CHARACTERISTICS.

The month was not distinguished by any remarkable storm. The mean pressure was quite uniformly distributed, but the low pressure that stretches northward from the Gulf of California was unusually well marked. The temperature was slightly above the average in the Lake Region and decidedly so in the Plateau Region; a few stations in Texas and adjoining States reported the highest mean pressure on record; the maximum temperatures in these regions were also the highest on record and the maximum for San Diego was 15° above the previous record. The rainfall was large in Florida and along the east Gulf Coast being the largest on record at Tampa and Meridian.

ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The *mean pressures* during the current month were highest on the immediate coast of Washington and Oregon and were also rather high on the south Atlantic Coast.

The highest were: Fort Canby, 30.11; Tatoosh Island and Eureka, 30.09; Port Angeles and Portland, Oreg., 30.07; Seattle, 30.06; Charleston and Jupiter, 30.05; Savannah, Jacksonsonville, Key West, and Tampa, 30.04. The mean for Bermuda was 30.16. The mean pressures were lowest in Arizona and low in the Gulf of St. Lawrence, Alberta, and Assiniboia. The lowest were: Yuma, 29.72; Phœnix, 29.76, Grindstone, 29.82, El Paso and Medicine Hat, 29.83; Calgary, Miles City, and Fresno, 29.84; Havre, 29.85.

As compared with the normal for June, the mean pressure was in excess over the north Pacific Slope, the Missouri and Mississippi valleys, and Lake Region. It was slightly deficient in the remaining regions. The greatest excesses were: Fort Canby, 0.11; Denver, 0.10; Tatoosh Island and Lander, 0.09; Pueblo and Port Angeles, 0.08; Wichita, 0.07. The greatest deficits were: St. Johns, N. F., 0.07; Yuma, 0.06; Fresno and Los Angeles, 0.04.

As compared with the preceding month of May, the pressures, reduced to sea level, show a rise over the upper Lake Region, the Mississippi and Missouri valleys and the north Pacific Slope, but a fall over the central and southern Plateau Region, California and the Atlantic States. The greatest rises were: Pierre and Huron, 0.12; Moorhead, St. Paul, Concordia, and Wichita, 0.11; Omaha, Kansas City, and North Platte, 0.10. The greatest falls were: St. Johns, N. F., Sydney, Charlottetown, Sacramento, and Fresno, 0.13; Chatham and Redbluff, 0.12; Halifax, 0.11.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. Hazen.

During the month of June eight storms or depression systems have been sufficiently marked to be traced and charted on Chart I. There have also been seven high areas traced on Chart II. In tracing these highs and lows it has been found extremely difficult at times to distinguish definite highs and lows with an apparent motion in any well defined or certain direction. Often one low will be absorbed by another following in the rear, or else it will fade away entirely. Often the only way in which such a system can be placed upon the map is by a study of the wind directions, since the bendings of the isobars inclose a very large region with no definite high or low. Some of the more important facts regarding the origin and apparent paths and motions of these highs and lows are given in the accompanying table. In presenting

this table it should be borne in mind that the figures showing apparent paths and velocities are quite uncertain at times, owing to the impossibility of locating any clear track. These velocities must be taken with a great deal of allowance, and must not have ascribed to them any extreme accuracy. Till we know more of the constitution and mechanism and cause of motion of these conditions in the upper air we must continue to grope in the dark and study apparent results as indicated by our weather maps. Indeed it is by no means unimaginable that we are dealing with several systems actually existing one above the other, and yet projected in a single system or bendings of isobars upon our weather maps.

The observations of wind velocity on Mount Washington during the passage of highs have shown that when the wind is of moderate velocity or steadily diminishes on the approach of a high, there will invariably be a very marked rise in pressure, often a greater rise than at the base. On the other hand, if the wind maintains its velocity as the high advances, the rise in pressure is slight, or almost unnoticeable. Here we have a slight indication of the constitution of the so-called high.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a.m.	44	90	8, a.m.	48	64	3,630	7.0	519	21.6
II	5, p.m.	51	98	7, p.m.	49	82	830	2.0	415	17.3
III	5, p.m.	42	126	11, a.m.	41	86	2,680	5.5	487	20.3
IV	8, a.m.	41	126	22, a.m.	28	80	6,460	14.0	466	19.4
V	20, a.m.	44	122	26, a.m.	43	64	4,310	6.0	719	30.0
VI	21, p.m.	42	128	27, p.m.	36	73	3,390	6.0	565	23.5
VII	26, p.m.	52	116	30, p.m.	38	73	3,170	4.0	794	33.1
Sums							24,470	44.5	3,965	165.2
Mean of 7 paths									566	23.6
Mean of 44.5 days									550	22.9
Low areas.										
I	1, a.m.	51	111	5, p.m.	46	87	2,330	4.5	518	21.6
II	4, p.m.	52	116	13, a.m.	49	53	4,610	8.5	543	22.6
III	9, p.m.	37	109	14, p.m.	39	70	3,840	5.0	769	32.0
IV	12, a.m.	53	116	13, p.m.	51	99	770	1.5	513	21.5
V	13, p.m.	52	113	16, p.m.	39	100	1,590	3.0	530	22.1
VI	18, p.m.	53	112	22, p.m.	47	59	2,750	4.0	688	28.7
VII	21, p.m.	51	116	26, p.m.	51	67	2,500	5.0	500	20.8
VIII	26, p.m.	52	101	30, a.m.	50	63	1,960	3.5	559	23.3
Sums							20,350	35.0	4,630	
Mean of 8 paths									578	24.1
Mean of 35 days									581	24.2

A short description is here given of each high and low noted during June.

HIGH AREAS.

I.—Unlike the lows, four of the highs took their origin from the north Pacific Coast. It is probable that the permanent high pressure in the south Pacific had moved to the north, and these highs were split off from that. No. I was first noted a. m. of 1st in Wisconsin; its path was to the east for seven days, and it was last seen in the Gulf of St. Lawrence 8th, a. m.

II.—First noted in Manitoba p. m. of 5th; its motion was east for two days, and was last noted to the north of Lake Superior p. m. of 7th.

III.—First seen off the middle Pacific Coast 5th, p. m.; its motion was at first east, then east-southeast, and was last seen in Indiana a. m. of 11th.

IV.—First noted off the middle Pacific Coast 8th, a. m.; its motion was southeast to Texas, where it turned 13th, p. m., to northeast, and then southeast, disappearing off the south Atlantic Coast 22d, a. m.

V.—Was first noted in north Oregon 20th, a. m.; its motion was nearly eastward for six days, and was last seen off the Nova Scotia coast 26th, a. m.

VI.—First noted off the north Pacific Coast 21st, p. m.; its motion was a little south of east, and it was last seen off the middle Atlantic Coast 27th, p. m.

VII.—Was first noted to the north of Montana 26th, p. m.; its course followed high No. VI, and disappeared off the middle Atlantic p. m. of 30th.

LOW AREAS.

I.—With a single exception, No. III, all the lows of this month have taken their origin in the region to the north of Montana; it is probable that there was a rather permanent area of low pressure in this region, and each depression system was split off from this permanent low or locus of low pressure; No. I started 1st a. m., moved eastward, and was last noted in upper Michigan 5th, p. m.

II.—First noted, 4th, p. m.; its motion was eastward for 8.5 days, and was last noted over Newfoundland a. m. of 13th.

III.—First noted in Colorado, p. m. of 9th; its path was at first north than east, and it finally disappeared off the middle Atlantic Coast p. m. of 14th.

IV.—First noted a. m. of 12th, and moved for only one and a half days eastward; it was seen last in Manitoba p. m. of 13th.

V.—First noted p. m. of 13th; its motion was south-southeast for three days, and it was last seen in Kansas 16th, p. m.

VI.—First noted p. m. of 18th; its motion was east for four days, and it was last seen off Nova Scotia 22d, p. m.

VII.—First seen p. m. of 21st; its motion was eastward, almost in the path of No. VI for five days; it was last seen at the mouth of the St. Lawrence 26th, p. m.

VIII.—First seen 26th, p. m.; it moved for 3.5 days eastward, and was last noted at the mouth of the St. Lawrence a. m. of the 30th; nearly the whole path of the last three storms was to the north of the stations of observation.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

There were a large number of severe thunderstorms, often accompanied by hail, during the month. The dates on which no severe thunderstorms were reported were: 1st, 2d, 10th, 11th, 12th, 19th, 26th, 28th, 29th, 30th.

No severe tornadoes occurred during the month, but minor tornadoes were reported in South Dakota on the 6th; near Oshkosh, Wis., on the 8th; at Wyeth, Ala., on the 9th; at Nutley, N. J., on the 21st, near Clayton, Wis., on the 24th, and at West Louisville, Ky., on the 27th. The record by dates is as follows:

3d.—Severe thunderstorms in the vicinity of Cincinnati, Ohio. Telegraph and telephone lines fences, and outbuildings damaged.

4th.—Severe hailstorms near Pender and Lincoln, Nebr.; heavy rains, accompanied by wind and hail, in central Kansas and in portions of Iowa, Indiana, Ohio, and Kentucky.

5th.—Heavy rain and hail storms, with high winds, in North Loup Valley, Nebr. The valley was flooded for miles; bridges, fences, and railroad tracks were washed away. Heavy rains also fell in the vicinity of Deadwood and Rapid City, S. Dak.; in Minnesota, Wisconsin, Iowa, the Missouri Valley, and in Ohio. The damages were generally confined to growing crops, bridges, and fences.

6th.—Severe windstorms were reported near Brazil, Ind., and in Daviess County, Mo. At Lynch, Nebr., a heavy wind blew down several buildings; loss, $1,000. A minor tornado passed through the town of Wentworth, Lake County, S. Dak.; the damage was light—not over $500. Virgil and Cavour, Beadle County, were visited by severe local storms, having some of the characteristics of tornadoes; the money value of property destroyed was about $1,500.

7th.—Hail and high winds caused some damage near Bluffton, Ind. Mexico, Mo., was visited by a severe wind and rain storm; buildings in the lowlands were flooded to a depth of 3 feet, and some damage was done to frail structures by the wind. Heavy rains and high winds were also reported at Cleveland, Chicago, and Leavenworth, Kans.; four persons were drowned in a culvert at the last-named place.

8th.—Local storms of greater or less intensity prevailed throughout Wisconsin, and a minor tornado was observed in Winnebago County; it destroyed a barn in its path and disappeared over Lake Winnebago.

9th.—A minor tornado passed through Wyeth City, a suburb of Guntersville, Ala., wrecking 5 frame houses, injuring 5 persons, and damaging property to the extent of $5,000. The storm path was about 200 yards wide. No other tornadoes were reported in this region, but a severe thunderstorm prevailed throughout eastern Tennessee, being especially violent in portions of Cocke County, where it is reported thousands of trees were blown down, buildings were damaged, and one person injured. Thunderstorms accompanied by hail were also reported from North Carolina.

13th.—Hail ruined the crops over a strip of country in Wake County, N. C.

14th.—High winds and tides prevailed on the New Jersey coast early in the morning of the 14th. The force of the winds was so great that several persons were blown overboard from wharves and vessels. The New England coast was also swept by unusually strong winds on the same date.

15th.—Severe thunderstorms were noted in portions of Maryland and Wisconsin.

16th.—High winds swept over portions of Nebraska. One dwelling and several small buildings were destroyed, one person killed, and three injured at Republican City, Nebr. An incipient tornado cloud was observed near Bismarck, N. Dak., on the same date; no damage.

17th.—A strong wind created much alarm and some damage to property at Guthrie, Okla. Portions of Payne, Noble, and Logan counties, in the same Territory, were also visited by a severe wind storm. Damage confined to crops and fences.

18th.—A waterspout was observed about one-half mile beyond the Charleston jetties, Charleston harbor, moving slowly northeastward.

20th.—Severe thunderstorms were observed in Wisconsin.

21st.—Severe thunderstorms occurred at St. Louis and Macomb, Mo. At the first-named place it was reported that property was damaged to the extent of $10,000. The storm was also felt in Iowa, Indiana, and Ohio. Violent thunderstorms also prevailed in northern New Jersey, eastern New York, and New England, and an incipient tornado was reported as having occurred at Nutley, N. J. Considerable damage was done by a severe thunderstorm at Poughkeepsie, N. Y., and also in the Nashua Valley, N. H. The damage at Poughkeepsie was estimated at $25,000.

22d.—Hailstorms of considerable severity were reported from portions of Illinois, Kansas, Nebraska, Oklahoma, and Georgia.

23d.—Torrential rains in southeastern Ohio, and in Marshall, Wetzel, and Tyler counties, W. Va., caused destructive floods in the tributaries of the Ohio, particularly the Little Muskingum. Cloud-bursts were also reported from Jeffersonville, Ind., and Hopkinsville Ky. Clark Co., Mo., was visited by a severe hailstorm.

24th.—A minor tornado passed over Clayton, Wis. Two persons were injured, six houses destroyed, and a few barns wrecked.

25th.—Severe thunderstorms passed over Detroit, Mich., and Creston, Iowa, houses were unroofed, and fences, chimneys, and awnings blown down.

27th.—A minor tornado passed over West Louisville, Ky. One dwelling was wrecked, one person killed, and one injured. Damage about $1,000.

The loss of life during the month was: By violent winds, 3; by lightning, 45.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperatures* published in Table I, for the regular stations of the Weather Bureau, are the simple means of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table V for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution of the observed monthly mean* temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart IV; the lines are drawn over the Rocky Mountain Plateau Region, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean temperatures* were: Yuma, 88.8; Galveston and Key West, 82.3; Corpus Christi, 80.6; Port Eads, 80.2. The lowest mean temperatures were: Tatoosh Island, 53.0; East Clallam, 53.4; Port Angeles, 53.8; Eureka, 54.0; Neahbay, 54.5; Port Crescent, 55.1; Pysht, Fort Canby, and Eastport, 56.4. Among the Canadian stations the highest were: Medicine Hat, 66.2; Spences Bridge, 65.9; Winnipeg, 65.0; Toronto, 64.1; Montreal, 63.6; Kingston, 63.4. The lowest were: St. Johns, 51.0; Banff, 52.6; Father Point, 52.3; Yarmouth, 54.6.

As compared with the normal for June the mean temperature for the current month was in excess over the Plateau Region, the Ohio Valley, and Lake Region, and deficient on the Pacific Coast. The greatest excesses were: Phœnix, 5.7; Abilene, 5.0; Swift Current, 4.8; Marquette, 4.4; Rapid City, Port Stanley, and Winnemucca, 4.2; Yuma, 4.0. The greatest deficits were: San Francisco, 2.6; Lynchburg, 2.4; Portland, Oreg., and Columbia, Mo., 2.1; New York, 1.8; Lexington and Charlotte, 1.7; Point Reyes Light, 1.6.

Considered by districts the mean temperatures for the current month show departures from the normal as given in Table I. The greatest positive departures were: Southern Slope (Abilene), 5.0; southern Plateau, 3.3. The greatest negative departures were: Middle Atlantic and north Pacific, 0.8.

The *years of highest and lowest mean temperatures* for June are shown in Table I of the REVIEW for June, 1894. The mean temperature for the current month was the highest on record at: Abilene, 83.1; Palestine, 81.6; Fort Smith, 78.4; Pueblo, 72.0; Santa Fe, 69.0; Idaho Falls, 62.4; Baker City, 59.6. It was the lowest on record at: Columbia, Mo., 72.8; Neahbay, 54.5.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: 117, Yuma (12th); 115, Phœnix (frequently); 106, Fresno (14th); 105, Abilene (8th), Walla Walla (28th); 104, Dodge City (14th); 103, El Paso (16th); 102, Redbluff (16th); 100, Oklahoma (15th), San Antonio (18th), Palestine (28th). The lowest maxima were: 64, Eureka (7th); 65, Point Reyes Light (23d); 69, Tatoosh Island (26th). The highest minima were: 73, Galveston (10th); 71, Key West (13th); 70, Port Eads (2d); 69, New Orleans (23d), Jupiter (14th),

Tampa (28th); 68, Corpus Christi (17th). The lowest minima were: 33, Idaho Falls (11th); 34, Baker City (10th); 36, Lander (11th), Northfield (3d); 37, Sault Ste. Marie (2d), Roseburg (10th), Pysht and East Clallam (13th).

The *years of highest maximum and lowest minimum temperatures* are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Yuma, 117; Walla Walla, 105; Palestine, 100; Roseburg, 98; Idaho Falls, 91; San Diego, 89; Port Angeles, 83. The minimum temperatures were the lowest on record at: Meridian, 58; Idaho Falls, 33.

The greatest daily range of temperature and data for computing the extreme and mean monthly ranges are given for each of the regular Weather Bureau stations in Table I. The largest values of the greatest daily ranges were: Miles City, 49; Lander, Pueblo, Idaho Falls, Port Crescent, Roseburg, and San Luis Obispo, 46; North Platte, Havre, and Winnemucca, 44. The smallest values were: Hatteras, 14; Key West and Tatoosh Island, 16; Jupiter and Galveston, 17; Kittyhawk, Point Reyes Light, and Eureka, 18; Block Island, 19; Wilmington, and Corpus Christi, 20. Among the extreme monthly ranges the largest were: Walla Walla and Roseburg, 61; San Luis Obispo, 60; Fresno, 59; Idaho Falls and Dodge City, 58; Miles City, 57; Spokane and Baker City, 56. The smallest values were: Galveston and Hatteras, 17; Key West, 18; Jupiter, 19; Eureka, 20; Port Eads, 21; Tatoosh Island, 23.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column for comparison with the departures of current conditions of vegetation from the normal condition.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
Middle Atlantic	+ 2.3	+ 0.4	New England	— 1.2	— 0.2
South Atlantic	+ 8.1	+ 1.4	Florida Peninsula	— 9.7	— 1.6
West Gulf	+ 7.8	+ 1.3	East Gulf	— 1.2	— 0.2
Ohio Valley and Tenn.	+ 9.5	+ 1.6	North Pacific	— 3.7	— 0.6
Lower Lake	+ 9.9	+ 1.6	Middle Pacific	— 0.8	— 0.1
Upper Lake	+20.5	+ 3.4			
North Dakota	+ 9.7	+ 1.6			
Upper Mississippi	+20.9	+ 3.5			
Missouri Valley	+20.3	+ 3.4			
Northern Slope	+10.0	+ 1.7			
Middle Slope	+22.2	+ 3.7			
Abilene (southern Slope)	+22.0	+ 3.7			
Southern Plateau	+ 7.7	+ 1.3			
Middle Plateau	+ 2.1	+ 0.4			
Northern Slope	+12.6	+ 2.1			
South Pacific	+ 4.8	+ 0.8			

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight of the vapor coexisting with the air contained in a cubic foot of space, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer, but a properly constructed evaporometer may be made to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effects of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

Measurements of evaporation within the thermometer shelters are difficult to make so as to be comparable at temperatures above and below freezing, and may be replaced by computations based on the wet-bulb temperatures. The absolute amount of evaporation from natural surfaces not protected from wind, rain, sunshine, and radiation, are being made at a few experimental stations and will be discussed in special contributions.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. A complete expression for the relation between atmospheric conditions and nervous sensations has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The total precipitation for the current month was heaviest in Florida and heavy in small areas within Missouri, Alabama, Louisiana, and the western part of North Carolina. It was least, viz, 0.00 in Central California and the adjacent portions of Nevada and Arizona.

The larger values at regular stations were: Tampa, 13.4; Pensacola, 12.5; Jacksonville, 9.4; Jupiter, 8.9; New Orleans, 8.2; Charleston and Meridian, 7.6; Mobile, 7.2.

The *diurnal variation*, as shown by tables of hourly means of the total precipitation, deduced from self-registering gauges kept at the regular stations of the Weather Bureau, is not now tabulated.

The *current departures* from the normal precipitation are given in Table I, which shows that precipitation was in excess at many stations on the Atlantic Coast as also generally in Florida, southern Georgia, Alabama, Mississippi, and western Louisiana. Elsewhere it was generally deficient. The large excesses were: Mobile, 7.1; Tampa, 6.5; Galveston, 4.5; Yarmouth, 4.4; Norfolk, 3.7; Detroit, 3.3; New York, 3.2. The large deficits were: Omaha, 3.8; Palestine, 3.5; Kansas City, 2.9; Fort Smith, 2.8; Des Moines, 2.7.

The *average departure* for each district is also given in Table I. By dividing these by the respective normals the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normals exceed 100):

Above the normal: Middle Atlantic, 119; Florida, Peninsula, 144; east Gulf, 129; Lower Lake, 103.

Normal: Southern Plateau, 100.

Below the normal: New England, 97; south Atlantic, 92; west Gulf, 39; Ohio Valley and Tennessee, 83; upper Lake, 60; lower Lake, 76; upper Mississippi, 76; Missouri Valley, 71; northern Slope, 70; middle Slope, 84; southern Slope, (Abilene), 66; middle Plateau, 27; northern Plateau, 65; north Pacific, 85; middle Pacific, 20; south Pacific, 0.00.

The years of greatest and least precipitation for June are given in the REVIEW for June, 1890. The precipitation for the current month was the greatest on record at: Vineyard Haven, 3.59; Meridian, 7.55; Tampa, 13.42. It was the least on record at Northfield, 1.62; Nashville, 1.82; Palestine, 0.71; Pueblo, 0.35.

The total accumulated monthly departures from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	*Per ct.*		*Inches.*	*Per ct.*
North Dakota	+ 3.00	129	New England	− 3.60	84
Missouri Valley	+ 0.20	101	Middle Atlantic	− 1.00	95
Middle Plateau	+ 1.70	123	South Atlantic	− 5.20	80
North Pacific	+ 5.30	116	Florida Peninsula	− 0.10	99
Middle Pacific	+ 2.70	114	East Gulf	− 4.50	82
			West Gulf	− 6.20	73
			Ohio Valley and Tenn	− 6.70	74
			Lower Lakes	− 0.30	98
			Upper Lakes	− 2.40	85
			Upper Mississippi	− 0.70	96
			Northern Slope	− 0.40	95
			Middle Slope	− 2.60	79
			Abilene (southern Slope)	− 6.90	48
			Southern Plateau	− 0.80	70
			Northern Plateau	− 0.80	92
			South Pacific	− 1.90	76

Details as to *excessive precipitation* are given in Tables XII and XIII.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 1, 2, 22, 26. Arizona, 20, 25, 29, 30. Arkansas, 1, 2, 8, 17, 21. Colorado, 2, 5, 6, 9, 10, 19 to 25, 28, 30. Georgia, 1, 4, 10, 16. Idaho, 1, 2, 3, 5, 8, 15, 17, 18, 27, 29, 30. Illinois, 6, 7, 8, 17, 19, 24, 27. Indiana, 3, 4, 8. Iowa, 5, 6, 7, 16, 20, 23, 24, 25, 27, 28. Kansas, 1, 3, 4, 6, 16, 17, 18, 20 to 25, 27. Kentucky, 5, 8, 12, 16, 17. Maine, 11, 18. Maryland, 16. Massachusetts, 21. Michigan, 2, 5, 7, 14, 25. Minnesota, 4, 5, 6, 18, 24, 26, 27. Mississippi, 1, 16. Missouri, 1, 6, 7, 17, 21, 22, 23, 25. Montana, 3, 4, 17, 22, 23. Nebraska, 3 to 7, 16, 19, 20, 21, 24 to 27, 30. New Hampshire, 11, 21. New Jersey, 9, 18, 21. New Mexico, 22, 25, 28. New York, 14. North Carolina, 9, 13. North Dakota, 2, 15, 16, 20, 21, 27. Ohio, 3, 6, 7, 11, 13, 14, 15, 25. Oklahoma, 7. Oregon, 5, 9, 16, 29, 30. Pennsylvania, 16, 17, 20. South Dakota, 4, 6, 10, 14 to 17, 20, 22, 29, 30. Tennessee, 1, 15. Utah, 1, 2, 3, 16, 22, 29. Virginia, 15, 18. Wisconsin, 6, 7, 14, 15, 18, 19, 24, 25, 27. Wyoming, 17, 18, 23, 24.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 17 regular stations of the Weather Bureau by its photographic, and at 23 by its thermal effects. At one station records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric sheets show seventy-fifth meridian time; for convenience the results are all given in Table XI for each hour of local mean time.

Photographic and thermometric registers give the duration of that intensity of sunshine which suffices to make a record, and, therefore, they generally fail to record for a short time after sunrise and before sunset, because, even in a cloudless sky, the solar rays are then too feeble to affect the self-registers. If, therefore, such records are to be used for determining the amount of cloudiness, they must be supplemented by special observations of the sky near the sun at these times. The duration of clear sky thus specially determined constitutes the so-called twilight correction (more properly a low-sun correction), and when this has been applied, as has been done in preparing Table XI, there results a complete record of the clearness of the sky from sunrise to sunset in the neighborhood of the sun. The twilight correction is not needed when the self-registers are used for ascertaining the duration of a special intensity of sunshine, but is necessary when the duration of cloudiness is alone desired, as is usually the case.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table XI.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the duration relative to possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for June, 1896, is 12 per cent for photographic and 16 per cent for thermometric records.

The details are shown in the following table, in which the stations are arranged according to the greatest possible duration of sunshine, and not according to the *observed* duration as heretofore.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine. Photographic.	Difference.	Thermometric.	Difference.
		H'rs.	%	%	%	%	%
Bismarck, N. Dak	P.	475.6	60	67	+ 7		
Helena, Mont	P.	475.6	68	71	+ 3		
Portland, Oreg.*	T.	471.7	61			61	0
Portland, Oreg.*	P.	471.7	61	62	+ 1		
Eastport, Me.	P.	466.7	45	60	+15		
Minneapolis, Minn	T.	466.7				73	
Northfield, Vt	P.	463.5	37	51	+14		
Portland, Me	T.	463.5	38			60	+22
Rochester, N. Y	T.	459.9	67			74	+ 7
Buffalo, N. Y **	T.	459.9					
Boston, Mass	T.	456.2	52			57	+ 5
Chicago, Ill	T.	456.2	63			84	+21
Cleveland, Ohio	P.	456.2	50	63	+13		
Des Moines, Iowa	T.	456.2	39			61	+22
Detroit, Mich	T.	456.2	61			70	+ 9
Dubuque, Iowa	T.	456.2	45			71	+26
Eureka, Cal	P.	451.9	57	58	+ 1		
New York, N. Y	T.	451.9	50			51	+ 1
Salt Lake City, Utah	P.	451.9	49	83	+34		
Colorado Springs, Colo	T.	449.0	44			54	+10
Denver, Colo	P.	449.0	50	67	+17		
Philadelphia, Pa	T.	449.0	37			67	+30
Baltimore, Md	T.	445.9	37			45	+ 8
Cincinnati, Ohio	T.	445.9	57			81	+24
Kansas City, Mo	P.	445.9	46	56	+10		
St. Louis, Mo	T.	445.9	49			71	+22
Washington, D. C	P.	445.9	44	51	+ 7		
Dodge City, Kans	P.	443.1	64	80	+16		
Louisville, Ky	T.	443.1	45			73	+38
San Francisco, Cal	T.	443.1	70			77	+ 7
Santa Fe, N. Mex	P.	437.2	64	79	+15		
Little Rock, Ark	T.	434.3	48			77	+29
Atlanta, Ga	T.	431.5	60			78	+18
Wilmington, N. C	T.	431.5	38			48	+10
Phœnix, Ariz	P.	428.7	87	98	+11		
San Diego, Cal	P.	428.7	58	60	+ 2		
Savannah, Ga	P.	425.8	29	58	+29		
Vicksburg, Miss	T.	425.8	70			77	+ 7
New Orleans, La	T.	420.9	62			62	0
Galveston, Tex	P.	419.0	82	88	+ 6		

* Record by both methods. ** Record incomplete.

WIND.

The *prevailing winds* for June, 1896, viz, those that were recorded most frequently, are shown in Table I for the regular Weather Bureau stations.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart IV, where the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a uniform wind of average velocity. These figures indicate the relative extent to which winds from different directions counterbalanced each other.

HIGH WINDS.

Maximum wind velocities of 50 miles or more per hour were reported during this month at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Amarillo, Tex	9	64	n.	Huron, S. Dak	6	53	sw.
Do	10	60	se	Do	7	56	sw.
Do	11	56	n.	Pierre, S. Dak	6	52	sw.
Do	21	52	w.	Do	7	50	w.
Block Island, R. I	14	64	e.	St. Louis, Mo	21	52	nw.
Chicago, Ill	7	50	sw.	San Antonio, Tex	11	52	n.
Detroit, Mich	25	50	w.	Sioux City, Iowa	6	56	sw.
Fort Canby, Wash	7	54	se.				

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 6th, 243; 7th, 245; 8th, 229; 9th, 200; 17th, 213; 20th, 204; 21st, 335; 24th, 216; 25th, 202.

Thunderstorm reports were most numerous in: Ohio, 424; Missouri, 293; North Carolina, 219; Illinois, 210.

Thunderstorms were most frequent in: Florida, 29 days; Alabama, Colorado, Illinois, Missouri, South Dakota, and West Virginia, 26; Idaho, Iowa, North Carolina, and Ohio, 25.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 20th to the 28th, inclusive. On the remaining twenty-one days of this month 40 reports were received, or an average of about 2 per day. The dates on which the number of reports especially exceeded this average were: 5th, 5; 8th and 11th, 4; 29th, 8.

Auroras were reported by a large percentage of observers in: Delaware, 50; New Hampshire, 30; Maine, 12.

Auroras were reported most frequently in: New Hampshire, 7 days; North Dakota, 5; Minnesota and Wisconsin, 4; Delaware, 3.

CANADIAN REPORTS.

Thunderstorms were reported as follows: Grindstone, 19th; Grand Manan, 21st, 22d; Yarmouth, 9th, 22d; St. Andrews, 21st, 22d; Charlottetown, 22d: Chatham, 4th, 18th; Father Point, 22d; Quebec, 4th, 18th, 21st, 22d, 29th; Montreal, 7th, 21st; Rockliffe, 6th; Toronto, 6th, 7th, 21st, 28th; Port Stanley, 6th, 7th, 8th, 9th, 21st, 25th; Saugeen, 26th; Parry Sound, 5th; Port Arthur, 18th, 27th; Winnipeg, 4th, 15th, 24th, 26th; Minnedosa, 4th, 14th, 16th, 18th, 26th, 27th; Qu'Appelle, 16th, 22d, 26th; Medicine Hat, 5th, 10th; Swift Current, 2d, 3d, 19th, 23d; Banff, 2d; Edmonton, 1st, 2d, 8th, 12th, 16th, 18th, 22d, 26th; Battleford, 2d, 14th, 15th, 18th, 21st, 23d.

Auroras were reported as follows: Father Point, 5th, 7th, 14th, 15th, 16th, 17th; Quebec, 2d, 14th, 15th, 16th, 17th, 26th, 29th; Montreal, 16th; Toronto, 26th; Winnipeg, 8th, 9th; Minnedosa, 1st; Banff, 9th, 11th, 13th, 14th, 21st, 23d; Prince Albert, 9th, 15th, 17th, 30th.

INLAND NAVIGATION.

The *extreme and average stages of water* in the rivers for the current month are given in Table VIII, from which it appears that the Willamette, at Portland, Oreg., remained above the danger line from the 1st to the 25th, being highest, 23.8, on the 23d, 24th, and 25th. The only other cases in which the rivers approached the danger line were the lower Missouri, which rose to within 3 or 4 feet, and the upper Mississippi, which rose to within 1, 2, or 3 feet of the danger line.

On the 6th heavy rainstorms occurred in the interior of Ohio; also in Marshall County, W. Va., and in Belmont County, Ohio, all in the vicinity of Wheeling, W. Va. As a result, the tributaries of the Ohio rose very suddenly. Three lives were lost by drowning and a large amount of railroad property, bridges, trestles, etc., was destroyed.

Destructive rain and wind storms occurred in Minnesota, Wisconsin, Iowa, Illinois, and Missouri. Five persons were drowned, a number were injured by the wind; hundreds of cattle, sheep, and hogs were drowned. Newspaper estimates place the damage at half a million dollars.

METEOROLOGY AND MAGNETISM.

By Prof. Frank H. Bigelow.

For a description of the methods of constructing the tables and curves of Chart V, see the Weather Review for October, 1895, and January, 1896. The numbers in the columns H. and D. are added respectively to the mean values for Washington and Toronto, i. e., H=0.18250; D=180.'0. The values of the vertical force are omitted, as well as *dz*, *s* and *a*, which depend upon it.

CLIMATE AND CROP SERVICE.

By James Berry, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective services.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 77.2°, or 0.6° below normal; the highest was 100°, at Ashville on the 26th, 27th, and 30th, at Eufaula on the 29th, and at Goodwater on the 30th; the lowest was 48° at Valleyhead on the 15th. The average precipitation was 5.24, or 0.44 above normal; the greatest monthly amount, 13.15, fell at Daphne, and the least, 1.94, at Opelika.

Arizona.—The mean temperature was 83.6°, or 6.6° above normal; the highest was 127°, at Fort Mojave on the 15th, and the lowest, 35°, at Flagstaff on the 4th. The average precipitation was 0.24, or 0.12 below normal; the greatest monthly amount, 1.81, fell at Fort Huachuca. Nineteen stations reported no precipitation.

Arkansas.—The mean temperature was 77.7°, or 0.8° above normal; the highest was 103°, at Malvern on the 27th, and the lowest, 48°, at Silver Springs on the 3d. The average precipitation was 1.91, or 2.14 below normal; the greatest monthly amount, 4.65, fell at Stuttgart, and the least, 0.10, at Texarkana.

California.—The mean temperature was 72.5°, or 1.7° above normal;

the highest was 130°, at Volcano Springs on the 12th, and the lowest, 21°, at Bodie on the 11th. The average precipitation was 0.03, or 0.28 below normal; the greatest monthly amount, 1.10, fell at Mountain Home Hill, Tulare County, at an elevation of 6,680 feet. Numerous stations reported "no precipitation."

Colorado.—The mean temperature was 3.0° above normal; the highest was 107°, at Lamar on the 14th, and at Delta on the 17th, the lowest, 22°, occurred at Alma. The average precipitation was 1.02, or about 0.34 below normal; the greatest monthly amount 3.99 fell at Fleming. No precipitation occurred at Delta.

Florida.—The mean temperature was 79.8°, or 0.2° below normal; the highest was 100°, at Emerson on the 1st and 20th, and the lowest, 54°, at Tallahassee on the 3d. The average precipitation was 10.78, or 5.16 above normal; the greatest monthly amount, 20.90, occurred at Fort Myers, and the least, 3.10, at Key West.

Georgia.—The mean temperature was 78.0°, or about normal; the highest reported was 104°, at Albany on the 30th, and the lowest, 46°, at Clayton on the 14th. The average precipitation was 3.55, or about the usual amount; the greatest monthly amount, 7.81, fell at Quitman, and the least, 0.90, at Monticello.

Idaho.—The mean temperature was 62.2°; the highest was 103°, at Lewiston and Payette on the 28th and Pollock on the 29th; the lowest was 25°, at Murray on the 3d and Swan Valley on the 11th. The average precipitation was 1.08; the greatest monthly amount, 3.24, fell at Grangeville, and the least, 0.05, at Downey.

Illinois.—The mean temperature was 71.4°, or 0.4° above normal; the highest was 100°, at Mascoutah on the 20th, and the lowest, 39°, at Fort Sheridan on the 1st and at Dwight on the 14th. The average precipitation was 3.88, or 0.72 below normal; the greatest monthly amount, 8.29, fell at Cisne, and the least, 1.59, at Sycamore.

Indiana.—The mean temperature was 71.2°, or 0.9° below normal; the highest was 100°, at Angola on the 25th, and the lowest, 40°, at Hammond on the 10th. The average precipitation was 4.29, or 0.26 above normal; the greatest monthly amount, 7.59, fell at Scottsburg, and the least, 2.04, at Syracuse.

Iowa.—The mean temperature was 69.1°, which is the normal for the month; the highest was 100°, at Malvern on the 16th, and the lowest, 40°, at Audubon on the 1st. The average precipitation was 3.11, or 1.84 below normal; the greatest monthly amount, 7.89, fell at Atlantic, and the least, 0.81, at Vinton.

Kansas.—The mean temperature was 74.1°, or 0.4° above normal; the highest was 114°, at Meade on the 14th, and the lowest, 39°, at Colby on the 1st. The average precipitation was 4.32, or 0.01 above normal; the greatest monthly amount, 9.97, fell at Salina, and the least, 0.86, at Ulysses.

Kentucky—The mean temperature was 73.5°, or 1.0° below normal; the highest was 98°, at Ashland on the 7th and at Pryorsburg on the 19th; the lowest, 46°, at Eubanks on the 12th. The average precipitation was 4.64, or 0.56 above normal; the greatest monthly amount, 11.22, fell at Blandville, and the least, 2.02, at Fords Ferry.

Louisiana—The mean temperature was 80.1°, or 0.9° above normal; the highest was 104°, at Liberty Hill on the 20th; the lowest, 50°, at Oberlin on the 3d, and Davis, Oxford, and Robeline on the 13th. The average precipitation was 5.73, or 0.45 below normal; the greatest monthly amount 12.84, fell at Wallace, and the least, 0.31, at Lake Providence.

Maryland.—The mean temperature was 70.4°, or 1.7° below normal; the highest was 100°, at Western Port on the 20th, and the lowest, 32°, at Deer Park on the 2d. The average precipitation was 4.03, or 0.57 above normal; the greatest monthly amount, 7.63, fell at Dover, Del., and the least, 1.61, at Distributing Reservoir, D. C.

Michigan.—The mean temperature was 65.8°, or 1.0° below normal; the highest was 97°, at Bronson on the 6th, and the lowest, 31°, at Baraga and Lathrop on the 1st. The average precipitation was 2.92, or 0.29 below normal; the greatest monthly amount, 7.16, fell at Battle Creek, and the least, 0.64, at Muskegon.

Minnesota.—The mean temperature was 66.5°, or 0.7° below normal; the highest was 100°, at Dawson on the 24th, and the lowest, 30°, at Tower on the 4th. The average precipitation was 4.06, or 0.43 above normal; the greatest monthly amount, 9.76, fell at Luverne, and the least, 1.52, at Ada.

Mississippi.—The mean temperature was 78.5°, or 0.5° below normal; the highest was 104°, at Columbus on the 27th, and the lowest, 46°, at Corinth on the 13th. The average precipitation was 4.50, or 0.25 above normal; the greatest monthly amount, 10.21, fell at Hazelhurst, and the least, 0.20, at Hernando.

Missouri.—The mean temperature was 72.2°, or 1.3° below normal; the highest was 101°, at Grovedale and Princeton on the 19th, and the lowest, 45°, at Mineral Springs on the 3d. The average precipitation was 3.82, or 0.94 below normal. The greatest monthly amount, 9.97, fell at Hastian, and the least, 0.77, at Princeton. The precipitation for the month was very unevenly distributed, being far in excess of the normal at some stations, while at others, in the same section of the State, there was a marked deficiency. The heaviest rains occurred in the east-central, central, and southeastern portions of the State, where, over considerable areas, the total for the month exceeded 6 inches, and at a few stations even 8 inches, while portions of the northern and western sections received less than 2 inches.

Montana.—The mean temperature was 63.0°, or 2.0° above normal; the highest was 106°, at Radersburg on the 27th, and the lowest, 27°, at Wibaux on the 4th and at Radersburg on the 5th. The average precipitation was 1.76, or 0.15 below normal; the greatest monthly amount, 7.50, fell at Fort Custer, and the least, 0.34, at Kalispell. Many sections were visited by severe local thunderstorms and heavy downpours of rain.

Nebraska.—The mean temperature was 70.7°, or 1.2° above normal; the highest was 105°, at Curtis on the 18th, and the lowest, 39°, at Lexington on the 11th. The average precipitation was 4.04, or 0.21 above normal. The heaviest rainfall occurred in the northeastern section of the State, where the average for the month was 4.52. The least was in the western section, where the average was 2.85. The largest rainfall reported at any one station was 16.17 at Greeley Center, and the least, 1.30, at Fort Robinson.

New England.—The mean temperature was 63.3°, or 1.6° below normal; the highest was 96°, at Lawrence, Mass., on the 20th, and the lowest, 32°, at Lancaster, N. H., on the 3d. The average precipitation was 2.73, or 0.44 below normal; the greatest monthly amount, 5.71, fell at Waterbury Conn., and the least, 1.13, at Vernon, Vt.

New Jersey.—The mean temperature was 68.1°, or 1.3° below normal; the highest was 97°, at Toms River on the 9th, and the lowest, 37°, at Charlotteburg on the 3d. The average precipitation was 5.46, or 1.48 above normal; the greatest monthly amount, 13.45, fell at Ocean City, and the least, 2.64, at Cape May City.

New Mexico.—The highest temperature was 114°, at Rincon on the 17th and the lowest, 22°, at La Belle on the 13th. The greatest monthly precipitation, 3.00, fell at Shattucks Ranch; no precipitation at Fort Bayard and only "trace" at Aztec and Fort Wingate.

New York.—The mean temperature was 64.7°, or 1.2° below normal; the highest was 96°, at Mount Morris on the 8th, and at Watertown on the 9th; the lowest, 31°, at Arcade, New Lisbon and South Canisteo on the 3d. The average precipitation was 3.16, or 0.27 below normal; the greatest monthly amount, 6.67, fell at Brooklyn, and the least, 1.43, at Lockport.

North Carolina.—The mean temperature was 73.1°, or 1.2° below normal; the highest was 97°, at Chapel Hill on the 26th, and the lowest, 39°, at Linville on the 15th. The average precipitation was 5.36, or 0.93 above normal; the greatest monthly, 10.18, fell at Willeyton, and the least, 2.34, at Hatteras.

North Dakota.—The mean temperature was 65.6°, or 1.0° above normal; the highest was 97°, at Kelso on the 30th, and the lowest, 37°, at Forman on the 2d. The average precipitation was 3.80, or 0.38 above normal; the greatest monthly amount, 7.08, fell at Berthold Agency, and the least, 0.94, at Kelso.

Ohio.—The mean temperature was 69.5°, or 0.7 below normal; the highest was 98°, at Defiance on the 6th and Bethany on the 19th; the lowest, 33°, at Green hill on the 2d. The average precipitation was 4.81, or 0.87 above normal, one of the wettest Junes on record; the greatest monthly amount, 10.78, fell at Warren, and the least, 1.44, at Rockyridge.

Oklahoma.—The mean temperature was 78.9°; the highest was 109°, at Norman on the 15th, and the lowest, 45°, at Winnview on the 1st, and at Pond Creek on the 11th. The average precipitation was 3.28; the greatest monthly amount, 7.26, fell at Stillwater, and the least, 0.67, at Kemp.

Pennsylvania.—The mean temperature was 67.4°, or 2.3° below normal; the highest was 98°, at Aqueduct on the 20th, and the lowest, 32°, at St. Marys on the 2d and at Shinglehouse on the 3d. The average precipitation was 4.64, or 0.90 above normal; the greatest monthly amount, 9.11, fell at Indiana, and the least, 1.89, at Dyberry.

South Carolina.—The mean temperature was 77.9°, or 0.4° above normal; the highest was 102°, at Gillisonville and Shaws Forks on the 26th, and the lowest, 52°, at Clemson College and Greenville on the 14th. The average precipitation was 5.42, or 0.80 above normal; the greatest monthly amount, 10.45, fell at St. Georges, and the least, 1.94, at Clemson College.

South Dakota.—The mean temperature was 67.0°, or about 2.0° above normal; the highest was 104°, at Cherry Creek on the 29th, and the lowest, 29°, at Plankinton on the 1st. The average precipitation was 4.13, or 0.63 above normal; the greatest monthly amount, 7.9[illegible], fell at Millbank, and the least, 1.25, at Farmingdale.

Tennessee.—The mean temperature was 74.0°, or about normal; the highest was 99°, at Arlington on the 22d, and the lowest, 48°, at Tullahoma on the 14th. The average precipitation was 4.54, or 0.20 above normal; the greatest monthly amount, 8.85, fell at McMinnville, and the least, 1.63, at Bolivar.

Texas.—The temperature on an average for the State was 2.7° above normal. There was a general excess in all localities except over the extreme western portion of the State, where there was a slight deficiency. The excess ranged from 0.6° to 3.5° over the coast district and southwest Texas, and from 3.2° to 5.0° over north, central, and east Texas, with the greatest in the vicinity of Abilene. The highest was 111°, at Roby on the 9th, and the lowest, 45°, at Happy on the 12th.

The precipitation on an average for the State was 2.02 below normal. There was a general deficiency east of the one hundredth meridian, while to the westward there was a general excess, with the greatest in the vicinity of Fort Ringgold (Rio Grande City), where it amounted to 1.65. The deficiency for the month ranged from 0.83 to 3.95 over north, central, east, and southwest Texas, and from 0.48 to 4.49 over the coast district, with the greatest over the extreme eastern portion. The greatest monthly amount, 4.03, occurred at Fort Ringgold, while no rain fell at several stations.

Utah.—The mean temperature was 70.0°, or about 2.0° above normal; the highest was 112°, at St. George on the 16th, and the lowest, 21°, at at Soldier Summit on the 10th. The average precipitation was 0.20, or about 0.50 below normal; the greatest monthly amount recorded was 2.00, at Thistle. No rain occurred at St. George, Pahreah, and Park City.

Virginia.—The mean temperature was 71.4°, or 2.3° below normal; the highest was 96°, at Bonair on the 29th and at Cape Henry on the 22d, and the lowest, 35°, at Guinea on the 12th. The average precipitation was 5.27, or 1.59 above normal; the greatest monthly amount, 8.18, fell at Sunbeam, and the least, 1.35, at Birdsnest.

Washington.—The mean temperature was 59.3°, or 0.6° above normal; the highest was 106°, at Moxee on the 28th, and the lowest, 28°, at Cascade Tunnel on the 13th. The average precipitation was 1.64, or 0.26 below normal; the greatest monthly amount, 5.12, fell at Monte Christo, and the least, 0.07, at Moxee.

West Virginia.—The mean temperature was 69.3°, or slightly below normal; the highest was 95°, at Spencer on the 25th, and the lowest, 39°, at Bloomery on the 2d. The average precipitation was 5.35, or more than 1.00 above normal; the greatest monthly amount, 9.86, fell at Monarch, and the least, 2.91, at Spencer.

Wisconsin.—The mean temperature was 66.8°, or about 1.0° below normal; the highest was 95°, at Appollonia on the 22d and at Bayfield on the 30th, and the lowest, 29°, at Antigo and Mayford on the 1st. The average precipitation was 3.37, or slightly below normal. The greatest monthly amount, 6.83, fell at Viroqua, and the least, 0.51, at Crandon.

SPECIAL CONTRIBUTIONS.

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KITE EXPERIMENTS AT THE WEATHER BUREAU.

By C. F. MARVIN, Professor of Meteorology, U. S. Weather Bureau.

[Continued from the MAY REVIEW.]

FORMS AND CONSTRUCTION OF THE WEATHER BUREAU KITES.

[Continued.]

Characteristics of wing surfaces.—The cross-section of the wings of birds presents characteristics that are very different, as a rule, from those of a section of the surfaces ordinarily employed in kites. As wings are evidently highly efficient sustaining surfaces, we may do well to analyze their form carefully and inquire to what extent and in what respect those forms may be copied with advantage in constructing kites. Aside from the arched form commonly characteristic of wings and which in the same wing probably varies more or less in amount with changes of pressure, we observe that the front edge is firm, rigid and thick, and that the wing becomes thinner and more flexible towards the rear edge, which is elastic and quite pliable under comparatively feeble forces. Much has been written concerning the advantages of these peculiarities by some who have sought to solve the mysteries of the sailing flight of large birds.

Without entering here into a detailed analysis of the action of the wind pressure upon a wing and its reaction thereto, I am convinced that the peculiar usefulness various writers seek to attribute to every detail of the wing structure is very much exaggerated and overdrawn. At least grave errors and misconceptions have resulted because a sharp distinction has not been drawn between the essentially different use of its wings made by the bird when employed in gliding or sailing flight on fixed wings, as contrasted with flight by flapping the wings.

The action of the wind upon the wings of sailing birds is similar in several respects to the action of wind upon kites whereas, nothing in the action of ordinary kites resembles the wing-flapping of birds. Therefore, whatever qualities of wing surfaces are of special advantage in sailing flight may also be of advantage in kite surfaces. By far the most important of these is the arched character of wing surfaces, the advantages of which have already been noticed. In addition to this we observe that the wing is thick on the front edge. It seems hardly possible that any other consideration than that of strength alone can determine what this thickness should be. If nature could make a wing of adequate strength but yet with a smaller sectional area, she would do

so, and we believe it would serve the bird better. Again, the wing is also flexible so that the amount of curvature of its arched surface changes with different pressures. We are disposed to regard this as purely an incidental result. To have made a perfectly rigid wing, nature would have been obliged to make a heavier wing, which would be to the bird's disadvantage. The flexible wing is lighter, but yet of ample strength to resist the strains it may be called upon to bear. Although it can be shown that in wing-flapping-flight a slight advantage results from some flexibility, yet the same can not be shown to obtain to any important degree in sailing flight. We are forced, therefore, to the conclusion that for sailing flight the flexibility is an incidental quality. Finally, the thin, very flexible, feathers of which the rear edge of the wing is composed are believed to serve specially useful purposes in wing-flapping movements; but for sailing flight, in which the wings are set at comparatively small angles of incidence, if there is any special merit in the characteristics of the rear edges at all, it is not to any appreciable extent due to their flexibility, but rather to the fact that the streams of air flowing over the upper and under surfaces are able to unite into one stream which is not broken up into objectionable eddies and whirls.

Kites with wing-like surfaces.—Grave constructional difficulties are encountered in giving to the sustaining surfaces of kites those qualities that we have pointed out as being advantageous in the wings of birds. In one of the kites framed in accordance with the improved plan of construction described in the WEATHER REVIEW for May (page 164), the cloth was left free at the rear edge in order that the surface might be thin and pliable, like the rear edge of a bird's wing. This was accomplished by omitting the rectangular frames ordinarily forming the rear edges of the cells. The behavior of this kite in the air was, on the whole, very satisfactory. Nevertheless, the cloth formed into waves and fluttered to a greater or less extent, much as other kites having free edges of cloth had done. The kite was accidentally broken and the line of experiment was not carried any further. The dimensions of the kite are given in Table VI, No. 21.

Improved kite with arched surfaces.—Arching the sustaining surfaces of the improved kite is a matter of great simplicity. The cloth is simply left just a little slack between the two frames. Even when the cloth is fitted tight it will still arch upward to some extent when exposed to wind pressure. To make the depth of the arch about one-twelfth the cord requires, however, a slight looseness of the cloth between the frames. Thus far, I have made no effort to extend the arched effect to the side edges of the kite. The connecting sticks between the frames are straight. As a result the arched effect is most pronounced in the middle portion, gradually diminishing as the sides are approached, where it practically disappears. It is thus seen that in this kite the arched form of the surfaces can be secured without any additional material. When the first kite made of this form was flown in a moderately fresh wind the longitudinal truss was completely broken in two within ten seconds from the time the kite was launched. The break occurred at the point of attachment of the bridle and was caused, it is believed, primarily by the relatively greater pulling power of the arched surfaces. A very similar kite of greater area and with seemingly a more frail longitudinal truss was flown immediately afterward in fully as strong gusts of wind, but with no mishap whatever. When the broken truss was replaced by a stronger one the kite was flown with remarkable success in very light winds. In fact this kite flew when the wind was too light to sustain other cellular kites. Up to the first of July, however, no real test of the kite with arched surfaces had been made, owing to the lack of favorable opportunity.

Modified longitudinal truss.—When the truss is run through the inside of the cells, in the manner heretofore described, the slack cloth on the lower sustaining surfaces of the cells is partly prevented by the lower rib of the truss from forming the most effective arched surfaces. To avoid this difficulty the bottom stick of the longitudinal truss is arranged to come outside the cell, as shown in Fig. 57, which gives also the principal dimensions of the kite referred to in the foregoing remarks.

Other improved kites.—While the writer was engaged in developing and perfecting the construction of kites by means of the rectangular frames already described, Mr. Potter was working up certain modified forms of the cells. These were trapezoidal in form, rather than rectangular. In the first kite made each cell was provided with three, instead of two, sustaining surfaces. Long struts were used for spreading out the cloth surfaces. This involved cutting a rather large slotted hole in the middle surface of each cell to permit the passage of the diagonal struts. As a whole, the three-plane feature of this kite was not altogether satisfactory and was abandoned and a better kite constructed with simply a trapezoidal cell. This is shown in Fig. 58. The cell is spread by simply two long diagonal struts, instead of the four employed in the original Hargrave rectangle. This construction, with two long diagonal struts, was afterwards used for rectangular cells, also, and is recommended in preference to that shown in Fig. 50.[1]

Points of advantage.—As already mentioned, the arrangement of struts adopted in the trapezoidal cell simplifies the construction considerably, with a slight gain in lightness at the same time. The side surfaces being set inclined considerably to the vertical contribute in a slight degree as sustaining surfaces. The weight of the kite per unit area is rather less than that of the rectangular cell of the same size. There is nothing to prevent the cloth from fluttering, and the struts crossing within the interior of the cell offer some obstruction to the free flow of air through the cell. The oblique position of the side planes causes them to shelter in a slight degree the outer ends of the top surfaces, and it is believed there are more pronounced eddy effects in these corners than in the case of a cell of strictly rectangular form. The kites of this form appear to be the most steady and stable of any employed.

This form of kite is easier to make than kites of the frame construction, but although the latter are heavier the tests show they are superior, as will be brought out in a later section of this article, describing the results obtained.

The form of construction adopted in the trapezoid cell was also employed in making the rectangular cells. Prior to July 1 exact tests of the relative merits of the two forms had not been made, owing to the lack of favorable winds.

The Weather Bureau Kites.—Table VI contains a schedule of the dimensions, weights, etc., of the greater part of the kites employed in the Weather Bureau experiments made between December 1, 1895, and July 1, 1896. Considerable care has been expended in the preparation of this table in order to give full and accurate information concerning every important element. In comparing the results obtained with kites of different form, and with different kites of the same form, the weight per unit of sustaining area is a most important desideratum. The weights of the finished kites were therefore always determined with care and are given in the table. It is strongly recommended that other experimenters, when publishing results of their work, be careful to give accurate data respecting the weight and the actual sustaining surface, so that a proper basis for comparison may be had. It will generally be best to give the total weight, rather than the weight per unit area, because the *effective* sustaining surface may not always be the same as the *apparent* sustaining surface. For

[1] Fig. 50 will be found in the Weather Review for May, 1896.

example, a Malay kite 5 feet high and 5 feet broad appears to have a surface 12.5 square feet. When made in the usual way and with the cloth moderately taut, the lateral surfaces form a flat angle with each other, somewhat as shown in Fig. 34[1].

The angle at $C\ E\ D$ may sometimes be as much as 30° less than two right angles, and in such a case the sustaining effect of the 12.5 square feet will be no greater than that of about 12.1 square feet of surface not bent backward. Therefore, the true weight per unit of sustaining area in such a kite will be the total weight divided by 12.1 rather than 12.5. In other forms of kites more marked differences may arise. Some systematic method is therefore needed for accurately computing the effective sustaining surfaces of kites of different forms.

TABLE VI.—*Dimensions of Weather Bureau kite.*

Serial number.	Kind or shape of cell and material of covering.	Number.	Width of kite.	Height of cell.	Width of cloth bands.	Length of kite.	Actual surface of cloth.	Effective sustaining surface.	Total weight.	Weight per sqr. ft. sustaining surface.
			Ins.	*Ins.*	*Ins.*	*Ins.*	*Sq. Ft*	*Sq. Ft*	*Lbs.*	*Lbs.*
1	Rectangle, by struts, calico..	1	48	24	24.0	72	48.0	32.0	....	......
2	Malay, silk..................	....	68	....	......	60	16.2	......	....	......
3	Diamond, silk................	3	34	13	8.5	28	9.9	8.6	0.392	0.046
4	Kite, Fig. 41, cambric.........	1	80	....	9.0	54	16.2	14.6	2.51	0.172
5	Diamond, nainsook............	1	65	22	18.0	60	32.5	29.0	2.14	0.074
6	Diamond, 5 cells, cambric....	1	65	18	8.5	78	37.9	35.3	....	......
7	Hunter, wing kite, muslin...		40	16	14.6	48	16.3	13.8		
	Each wing..................	1	23	....	......	40	3.2	3.2	1.55	0.077
	Total.......................		....	....	......	......	27.2	20.2		
8	Kite, Fig. 42, cambric.........	1	33	....	15.0	45	26.5	......	....	......
9	Diamond, cambric.....	3	48	21	15.0	54	20.0	16.8	1.25	0.074
10	Diamond, 3 cell, cambric.....	1	48	21	15.0	93	30.0	25.2	....	......
11	Diamond, silk	5	40	17	13.0	43	14.4	12.0	0.91	0.076
12	Diamond, cambric............	1	40	17	13.0	43	14.4	12.0	1.20	0.100
13	Winged kite, silk.....		40	17	13.0	43	14.4	12.0		
	Each wing..................	1	23	....	......	43	3.5	3.5	1.14	0.067
	Total.......................		...	....	......	......	21.4	17.0		
14	Wing kite, cambric...........		48	17	15.0	45	24.0	21.2		
	Each wing..................	1	48	....	......	60	12.0	12.0	2.31	0.051
	Total		....	....	......	......	48.0	45.2		
15	Silk kite, cambric wings.....		40	17	13.0	43	14.4	12.0		
	Each wing..................	1	38	....	......	64	8.4	8.4	1.51	0.039
	Total		....	....	......	......	31.2	23.8		
16	Hunter, cylinder kite, Fig. 48.		27	27	23.0	60	26.5	.....		
	Muslin, each wing...........	1	34	....	.. ...	60	7.0	7.0	3.12	......
	Total.......................		....	. ..	......	......	40.5	.....		
17	Diamond, cambric............	2	48	17	15.0	45	24.0	21.2	1.54	0.073
18	Diamond, cambric......... ...	1	60	24	15.0	45	32.0	27.1	1.98	0.073
19	Rectangle, by struts, nainsook......................	1	48	18	17.6	54	32.3	23.5	2.08	0.088
20	Rectangle, by frames, cambric	1	48	16	19.0	52	33.7	25.3	2.43	0.096
21	Rectangle, one frame per cell, cambric..................	1	51.5	14	15.0	60	27.3	21.5	2.21	0.103
22	Rectangle, 3 planes, cambric, Fig. 56..................	1	48	21	19.2	78	49.6	38.4	3.54	0.092
23	Ditto, reconstructed, with but two planes.............	1	48	21	19.2	74	36.8	25.6	3.22	0.126
24	Ditto, with 3 planes	1	48	21	19.2	74	49.6	38.4	3.89	0.102
25	Trapezoid, 3 planes	1	...	....	......	......	......	......	....	......
26	Rectangle, by frames, paper..	1	60	13	19.2	60	39.2	32.0	....	......
27	Rectangle, by frames, cambric	1	48	16	19.0	65	33.7	25.3	3.04	0.120
28	Trapezoid, nainsook {top.... / bottom}	1	84 / 48	24	20.0	78	53.3	43.1	4.49	0.104
29	Trapezoid, nainsook {top.... / bottom}	1	80 / 48	24	18.0	54	46.4	36.7	3.06	0.083
30	Rectangle, by frames, cambric	1	60	20	19.2	70	42.7	32.0	3.59	0.112
31	Rectangle, by frames, cambric, cloth arched	1	60	13	19.2	76	39.2	32.0	3.34	0.104
32	Ditto, reconstructed.........	1	60	13	19.2	76	39.2	32.0	3.52	0.110
33	Rectangle, by struts, nainsook	1	48	21	20.0	72	38.3	26.7	2.80	0.105
34	Diamond, cambric............	1	30	13	9.6	33	8.0	6.6	0.374	0.057
35	Trapezoid, nainsook {top.... / bottom}	1	28 / 20	9	9.0	30	8.5	6.4	0.407	0.063
36	Rectangle, by frames, cambric	1	60	20	19.2	60	42.7	32.0	3.83	0.120

Explanation.—"Rectangle by struts," designates that the cell is a rectangle, and the form is given by means of a set of struts, such as shown in Figs. 50 or 59. "Rectangle by frames," designates that the rectangular cell is constructed as explained in connection with Figs. 51 to 55. The width of the kite is the crosswise dimension of the kite, that is, the dimensions at right angles to the direction of the flow of air over the surfaces. In the case of the diamond kites, the width is not measured from side to side in a straight line, but along the surface of the cloth. The width, therefore, represents one-half the perimeter of the cell. An idea of weight of the framework in the different kites may be obtained by comparing the weights per square foot of surface, with the following weights of materials employed in the covering:

	Pounds.
Weight of silk per square foot..................................	.0084
Weight of nainsook per square foot............................	.0126
Weight of cambric per square foot.............................	.0187
Weight of muslin per square foot..............................	.0220

Bridle.—It was impossible to specify within the limits of the table the arrangement of the bridle on each kite. This was often changed with each experiment and will receive consideration hereafter.

True and apparent angle of incidence.—Such a systematic method may be had by always taking account of the true angle with which the wind impinges against a surface in question. The distinction between the terms the *true angle of incidence* and the *apparent angle of incidence* will be understood from Figs. 60 and 61. With such a kite as shown in Fig. 60, the surface is flat and continuous, the angle which the wind makes with the midrib of the kite, when flying normally, is clearly also the true measure of the angle with which the wind impinges upon the surfaces themselves. In this case, therefore, the angle $A\ O\ W$ is the *true angle of incidence*. If, however, the surface is bent backward across the midrib so as to form a dihedral angle, the kite will then appear as shown in Fig. 61. It is plain in such cases that the angle between the wind and the midrib is not the same as the angle between the wind and the planes themselves. Inasmuch as the angle between the wind direction and the surfaces themselves can not easily be measured directly, we will generally prefer to measure the angle between the wind and midrib (or some similar longitudinal axis of the kite) as *representative* of the true angle of incidence. In those cases in which the angle between the wind and midrib is not the same as the true angle of incidence of the wind, the former angle, that is, the angle $A\ O\ W$, will then be called the *apparent angle of incidence*.

It will be readily understood by those familiar with geometric principles that the true angle of incidence of the surfaces in such a case as represented in Fig. 61 will be the angle $A'\ O'\ W'$. $A'\ O'$ is the line formed on the kite surfaces by the intersection of a plane through $W'\ O'$ and perpendicular to the kite surface. It can be shown without difficulty that the angle $A'\ W'\ E'$ will always be the same as the amount by which the planes are bent backward, that is, it is the same as the angle $E\ D\ C$. The relation between the real and apparent angle of incidence may be found as follows:

Let $b =$ the angle $A'\ W'\ E' = E\ D\ C$.
Let $i =$ the *real* angle of incidence of the wind $= A'\ O'\ W'$.
Also let $a =$ the apparent angle of incidence $= W'\ O'\ E'$.

Then, by trigonometry—

$$\frac{W'\ O' \sin. i = A'\ W'}{W'\ O' \sin. a = E'\ W'} = \cos. b.$$

$$\therefore \sin. i = \sin. a \cos. b.$$

The angle b, as we have stated, is the amount by which the planes are bent backward, and therefore is always known, or can be found.

When comparing, for example, two such kites as the diamond cell and the rectangular cell, shown in Figs. 40[2] and 50,[2] it is plain that when the midribs are set at the same angle in the air, the surfaces of the rectangular cell kite are inclined at a greater angle to the wind, and therefore experience a greater wind pressure than those of the diamond cell kite, shown in Fig. 40. To make a fair comparison between the kites, some allowance must be made, in the case of the

[1] Fig. 34 will be found in the Weather Review, April, 1896.

[2] Figs. 40 and 50 will be found in the Weather Review for May.

diamond cell kite, for the slighter inclination of its surfaces. Similarly, in the trapezoidal kite, shown in Fig. 58, the side surfaces act as sustaining surfaces to some extent. We can compute the amount of this by the aid of the equation given above, as will be hereafter explained.

To make the proper allowance for different inclinations, we must know how much greater the pressure is at one inclination than at another. Different experimental researches have given different results on this point. Chanute,[1] after a critical analysis of all available data, has concluded that Duchemin's formula is probably the most accurate representation we have of the law of variation of pressure, with changes in the angle of incidence. This law, however, is strictly applicable only to plane surfaces. The law for curved surfaces is known to be very different from that for flat surfaces. As yet, however, no satisfactory statement of this law for curved surfaces has been formulated, so far as known to the writer. Since the surfaces are sensibly flat in most of the cellular kites described in Table VI, and as the angles of incidence of the surfaces in different kites will all fall within 15° of an average inclination, the use of Duchemin's formula will answer every purpose for the present.

If the pressure on a given plane surface placed normal to the wind is regarded as 100, then the percentage pressure, P, on the same surface inclined to the wind at an angle, i, will, by Duchemin's formula, be—

$$P = \frac{2 \sin. i}{1 + \sin.^2 i} 100.$$

The relative pressure upon inclined surfaces is of such importance in connection with the kite problem, that the value of P for such angles of inclination as are likely to occur in kite work are extracted here from Chanute's larger table:

TABLE VII.—*Proportional pressure on inclined flat surfaces.*

Inclination.	Proportional pressure.	Inclination.	Proportional pressure.	Inclination.	Proportional pressure.
°	%	°	%	°	%
1	3.5	11	36.9	21	63.7
2	7.0	12	39.8	22	65.7
3	10.4	13	43.1	23	67.8
4	13.9	14	45.7	24	70.0
5	17.4	15	48.6	25	71.8
6	20.7	16	51.2	26	73.7
7	24.0	17	53.8	27	75.2
8	27.3	18	56.5	28	77.1
9	30.5	19	58.9	29	78.6
10	33.7	20	61.3	30	80.0

In order to allow for the dissimilar conditions of the surfaces of the several forms of kites the effective sustaining surface for each kite has been computed on the basis that the midrib or longitudinal axis of the kite makes an angle of 18° with the wind. Numerous measurements have shown that such an angle is roughly an average angle found in practice. In the case of a kite with cells of rectangular form it is plain that when the midrib is set at an angle of 18° to the wind the surfaces are also at the same angle, and no allowance is necessary. If, however, we consider the diamond cell we see that when the midrib is at 18° to the wind the surfaces are at a less angle, and we therefore rate the kite as if its area was less in the same proportion as its lifting power is lessened by the slighter inclination of the surfaces. This is further elucidated by an example. Kite No. 17, of Table VI, is a diamond cell kite in which the cloth surface is actually 24 square feet. From the tabulated dimensions of the kite we find that the angle by which the surfaces are bent backward from a flat surface is—

$$b = 20.7^\circ$$

Assuming the apparent angle of incidence to be 18°, that is, $a = 18^\circ$, we will have for the true angle of incidence—

$$\sin. i = \sin. 18^\circ \times \cos. 20.7^\circ = 0.2890$$
$$\therefore i = 16.8^\circ$$

That is, when the midrib of this kite is inclined to the wind at an angle of 18° the surfaces are inclined at an angle of 16.8°. From Table VII the pressure on a unit area of surface at 18° is 56.5 per cent of the normal pressure, while upon the same area at 16.8° the pressure is 53.3 per cent of the normal. Multiplying the area of the kite by the ratio of the above pressures, we obtain—

$$24 \times \frac{53.3}{56.5} = 22.6 \text{ sq. ft.}$$

That is to say, the 24 square feet of surface in the diamond cell experiences a pressure, other things remaining the same, that is just equal to the pressure on 22.6 sq. ft. of sustaining surface on a flat surface kite, or, a kite with cells of the rectangular form.

We must notice further that the pressure on the inclined surfaces is not exerted upward, but is normal to the surface and assumes a laterally inclined direction, whereas, with surfaces not inclined in the manner under consideration, the pressure is exerted almost directly upward. These differences are shown in Fig. 62, which represents an end view of a trapezoidal cell. The pressure on the parallel surfaces may be represented by lines such as $O\ B$, $O'\ B'$, while on the side surfaces the pressure acts in the direction of the lines $L\ S$ and $L'\ S'$. The upward lifting effect of an inclined pressure, such as $L\ S$ will be represented by a line such as $L\ T$. In reality, the lines representing the effects mentioned above are not strictly in the plane of the paper, but are differently inclined thereto. We may, however, leave out of consideration as unimportant the effects arising from the lines being differently inclined to the plane of the paper, and, by doing so it results approximately that if P represents the pressure on a surface such as the side of the trapezoid, or the surface of a diamond cell kite, then the upward directed effect of this pressure will be—

$$\text{Upward pressure} = P \cos. b.$$

Where b, as before, is the amount the planes are inclined backward. From these considerations it follows that to ascertain the equivalent sustaining effect of the surfaces in the diamond kite, the proportional pressure on the inclined surfaces must be multiplied by the cosine of the angle we have called b. That is, in case of kite No. 17.

$$\text{Equivalent surface} = 24 \times \frac{53.3}{56.5} \cos. 20.7^\circ = 21.3 \text{ sq. ft.}$$

In other words the effective sustaining surface of the kite in question is 21.2 square feet, which means that this kite with 24 square feet of actual surface (other things remaining the same) will pull the same as a kite with rectangular cells in which the total area of the top and bottom surfaces is 21.2 square feet.

In a similar manner we may determine the sustaining effect of the steeply inclined side surfaces in the trapezoid cell. In the kite shown in Fig. 58, the total area of the side surfaces is 16.7 square feet. The angle between the side and top surfaces is 53.1°, that is, $b = 53.1^\circ$. Therefore, when the midrib of the kite is inclined 18° to the wind—

$$\sin. i = \sin. 18^\circ \times \cos. 53.1^\circ = .1854.$$
$$\therefore i = 10.7^\circ.$$

That is, the true angle of incidence of the wind upon the side surfaces is 10.7° when the mid rib is inclined 18°. By means of the ratio of pressures we have—

$$16.7 \times \frac{35.9}{36.5} = 10.6$$

[1] Progress in Flying Machines.

That is, the total pressure on the 16.7 square feet is the same as the pressure on 10.6 square feet of the parallel surfaces of the kite. Introducing the further reduction necessary to resolve the pressure on the inclined surfaces to an upward directed pressure, we have—

$$10.6 \times \cos. 53.1^\circ = 6.36.$$

That is, the 16.7 square feet of inclined surfaces exercise approximately, the same lifting effect as 6.4 square feet of the surface in the top and bottom planes of the cells. The total area of the top and bottom planes is 36.7 square feet. Adding to this the 6.4 square feet equivalent surface in the side planes, we have—

Total effective sustaining surface = 43.1 square feet.

The above computations are based on an assumed angle of incidence of the midrib of 18°. If some other angle, such as 12° or 25°, had been assumed, the result would still have been very nearly the same; and it will be found that it is not of great importance just what angle of incidence is assumed for the midrib. It is necessary only that some common basis of comparison be had for the several forms of kites.

General Results.—It is unnecessary to describe in detail the behavior and the comparative results obtained with the several kites described in Table VI. In the earlier part of our experiments appliances were not available, or had not been devised, by which the action of the kites could be critically analyzed and tested. The work consisted in flying the kites alone, or two or three in tandem to the highest attainable elevations, which were deduced from the known length of wire out, the measured angular elevation of the kite, and the inclination of the wire at the reel. Tests of this character are of very little aid in perfecting kites; about all that can be gained is a knowledge of the qualities of steadiness and general features of kite behavior, and added thereto a most valuable personal experience in the management of kites. In a subsequent section the methods of systematically analyzing the action of kites that were introduced later in the course of our experiments will be described.

Relative steadiness of kites.—The most perfectly made kite will never remain steady in one position for more than a few seconds at a time, but will always move about more or less, now rising or falling, swaying now to the right or left, now steady for a moment, etc. These constant changes in its position are directly caused by corresponding changes in the motion of the air itself. Above elevations of 600 or 800 feet, it will be noticed that a kite is always much more steady than for lower elevations, and it often happens that a kite which darts about violently near the ground flies quite steadily when 500 feet or more aloft. While the great and constantly recurring changes of the wind cause the irregular motions of the kite, yet the amount that a kite will move under a given change depends upon the nature of the kite itself. The cellular kites are all (I speak only of well made kites) much steadier than nearly flat single surface kites. Nevertheless, kites with cells of different proportions differ greatly in steadiness. Roughly speaking the greater the distance between the top and bottom surfaces of the cell the more stable and steady the kite. It was found that of the kites described in Table VI those were most steady in which the *total cloth surface* was relatively great, as compared with the *effective sustaining surface.* In the rectangular cells the side surfaces, under normal conditions, do not experience any sustaining pressure at all. These surfaces, however, act in the most beneficial way to prevent sudden and extreme sidewise movements of the kite. When a deep-celled rectangular kite experiences a sudden and momentary unequal distribution of pressure over its surfaces, the kite shifts its position much more slowly than a shallow-celled kite of the same kind. In many cases it no doubt happens that the sudden inequality of pressures disappears and equilibrium is restored before the kite has shifted its position by more than a part of the shifting which would have been required had not the kite been steadied by the action of the relatively considerable extent of side surfaces. Similar effects are brought about in diamond kites when the short, or vertical diagonal of the diamond is relatively great. In the kite specified under No. 22, Table VI, and illustrated in Fig. 56, the middle plane of each cell could be removed. The kite always flew much steadier without the middle planes than with them. Large kites are more steady than small ones. Large kites were also found to be relatively heavier than small ones. The greater steadiness is no doubt, in part, directly a result of the greater mass, but the large kite experiences the average pressure of a considerable mass of air, which average pressure is no doubt less irregular than the average pressure of the very small stream of air intercepted by a very small kite.

The foregoing remarks apply wholly to well made kites. The darting and irregular movements of a kite which is defective in some respect are similar to those of a well made kite. The experienced kite flyer, however, is soon able to perceive when the motions are different from those caused by the usual variations of the wind, and therefore that something is wrong with the kite. The cause of erratic behavior in a kite known to be of good form may generally be traced to some lack of symmetry. It often happens that the defect exists in a pronounced manner only when the kite is under strain by the wind. Some weakness of the frame permits distortion when the strain exceeds a certain amount, and when the strain is removed the kite may appear to be all right.

Relative weights of kites.—The last column of Table VI gives the weights of the kites per square foot of sustaining surface. It is seen that very small kites, such as Nos. 3, 34, and 35, may be very light, nevertheless are quite stanch and strong. It will be shown further on that these small kites, notwithstanding the seeming advantage in weight, are less efficient than larger and heavier kites. The relative effects of edge pressures, waviness, eddies, etc., is believed to be large in small kites.

The winged kites were also very light in some cases, but experiments showed that these kites were entirely too weak, except for very light winds and that the frame work must be much stronger than that employed in the wing kites tested. Experience showed that, in general, stronger framing was necessary and the weight of the rectangle and trapezoid kites is noticeably greater than that of the diamond kites. The efficiency of these heavier kites was, however, in spite of the weight, greater than that of any others tested. The records of highest efficiency were obtained from kites Nos. 23, 29, and 36, which are the heaviest constructed. A light kite, even though less efficient, will attain a steeper angular elevation in a light wind than a more efficient kite of greater weight, but when the wind blows hard the inefficient kite increases its angular elevation but little, while, on the other hand, the efficient kite in a strong wind soars up to a high angular elevation. Elevations of a mile or more cannot be attained unless there is plenty of wind, i. e., winds capable of producing pressures amounting to six or eight times the weight of the kite.

It is important that a clear idea be formed of the exact manner in which the weight acts as one of the forces that determine how high a given kite can fly. The effect of the weight under different conditions of wind force is brought out by the following consideration of the diagram of forces shown in Fig. 63. To avoid confusion of ideas and a complex diagram of lines, the drawing shows only the parallelo-

gram of forces. We will also suppose for simplicity that the angle of incidence of the kite remains constant with different wind velocities. The line $A\ B$ is drawn parallel to the longitudinal axis of the kite and represents its inclination; $H\ N$ is a horizontal line; O is the point at which the lines of action of the wind pressure and gravity intersect. Let $O\ G$ represent the weight of the kite. (The weight of the better grade of kites in Table VI ranged between .09 and .12 pound per square foot of sustaining surface.) Let us suppose our kite weighs 10 pounds per square foot. Now, with a light wind of between 8 and 10 miles per hour experimental results show that the pressure per square foot of sustaining surface in ordinary kites will be barely twice as great as the weight per square foot. The line $O\ Q$, twice as long as $O\ G$, represents such a relation between these forces, and their resultant is a force represented by the line $O\ R$; $O\ H$ represents the direction the top end of the string must take. Under these conditions the kite on a short string can attain only a low angular elevation, represented by the angle $O\ H\ N$. If, however, the wind velocity were from 12 to 14 miles per hour, the pressure per square foot would be about double the former pressure. The conditions of equilibrium for such a case are given by the parallelogram $O\ Q'\ R'\ G$, and the string next the kite will take the direction $O\ H'$, which is very much steeper than its former direction, $O\ H$. It results, therefore, that the angular elevation of the kite has been greatly increased by only a small increase in the wind force. Let us next consider the effect of a still greater wind velocity, for example, 20 miles per hour. The pressure per square foot of surface for this velocity is fully ten times the weight of the kite per square foot. By constructing the parallelogram $O\ Q''\ R''\ G$, representing these relations, we locate the line $O\ H''$, which represents the direction of the string next the kite. The string in this case is only a little steeper than its former direction, $O\ H'$, notwithstanding that the wind pressure is considerably greater. With greater and greater wind pressures it will be found the direction of the string approaches closer and closer to the direction of the line $O\ M$, which represents the maximum possible steepness of the string. This degree of steepness could be attained if the weight of the kite were wholly inappreciable, or if the force of the wind were exceedingly great compared with the weight. From this analysis we see that in light winds the effect of the weight of the kite is very detrimental and causes the kite to fly at a low angle of elevation. The same result will follow with a heavy kite in a heavy wind. That is to say, whenever the wind pressure per square foot is only two or three times the weight per square foot the kite can then attain only a low angle of elevation. On the other hand, when the wind pressure per square foot is five or six times the weight per square foot the kite can take nearly its maximum possible angular elevation, and even though the wind pressures increase to fifteen or twenty times the weight, only a very slight increase in the angular elevation will result. The effect of such pressures is expended almost wholly in increasing the tension on the kite string.

On the choice of materials in the construction of kites.—Two very important and interesting problems are presented under this head, namely: (1) What materials are best suited for kite building? (2) How may a given material be used to the best advantage? To these questions full and complete answers can not yet be given, they can be brought out only as the result of actual tests and trials of many materials and many plans of construction. Nevertheless we may be greatly assisted in reaching the best results by a careful consideration of what is already known concerning the strength and resistance of ordinary materials and certain general methods of construction.

(1) *What materials are best for kites?*—Silk is probably the lightest material for covering or sustaining surfaces, but it is not very durable, and like all kinds of cloth it is more or less objectionably affected by rain and moisture. A cloth kite in the rain or in a cloud becomes heavier unless the material has been varnished or otherwise rendered waterproof. The fabrics employed in balloon construction are both waterproof and impervious to the wind, but they are considerably heavier than the ordinary unprepared cloth as is shown from the weights given in table VIII. Very light balloon fabrics are manufactured of silk but these are not of sufficient strength to use for kites without being reinforced with some sort of netting. If we turn from textile fabrics we find that sheet aluminum is apparently the best suited of metals for kite coverings. In kites of the usual size it will probably prove to be impracticable to use metal in sheets thinner than one-hundredth of an inch (equal to three thicknesses of this printing paper.) Sheet aluminum of this thickness weighs 0.1414 pounds per square foot; sheet steel of the same size weighs .408 pound per square foot, but it much stiffer. Let us see how a kite of aluminum or steel will compare, in weight, with a cloth and wood kite. Kite number 23, of table VI, is the heaviest one listed except number 4, which was unsatisfactory. Sheets of aluminum riveted together in the form of rectangular cells $48 \times 21 \times 19.2$ inches would require additional material to make the cell rigid. Moreover a longitudinal truss is required to unite the cells. The wooden truss used in kite number 23 weighed just 0.664 pound, or at the rate of 0.0260 pound per square foot of sustaining surface. The aluminum kite would require a truss at least as heavy as this, and including the weight of the side surfaces of the cells but omitting any allowance for the additional framing required to stiffen the cells, the total weight of the metal kite with wooden truss would be 0.229 pound per square foot of sustaining surface as compared with a weight of 0.126 pound per square foot for the cloth and wood construction. If sheet steel were employed the weight of the kite would be 0.614 pound per square foot, still no allowance being made for framing required in the cells. These computations show clearly that these sheet metals can not be substituted for cloth in the construction of kites designed to attain great elevations. Very thin boards of white pine one-sixteenth of an inch thick would be a trifle heavier per square foot than the thin sheet of aluminum previously considered, and would probably require less framing to stiffen the cells. Such thin boards are likewise, however, too heavy for kite surfaces.

Aluminum wire gauze, the meshes of which are filled with elastic varnish, has been proposed for aerial planes. Such material is said to weigh from 0.094 to 0.250 pounds per square foot, according to the size of the wire and number of ends per inch.

Vulcanized fibers are a little less than half as heavy as sheet aluminum of the same thickness. Hard sheet rubber or ebonite and celluloid have practically the same density as the vulcanized fibers.

From these considerations we see that ordinary woven fabrics of cotton, either plain or treated with rubber or oil varnishes, must be given the first ranks as probably best suited of all available materials for kite surfaces. They are relatively inexpensive and can be had in a great variety of grades or weights.

Framing materials for kites must be chosen from among comparatively a few substances. Two or three different sorts of wood, aluminum, and steel make up the list. The material best adapted to a given use will often be determined by the kind of strain to which it is subjected.

(*a.*) *Tensile strength.*—A slender piece of steel wire, for example, is quite powerless to resist either flexure or compression, but no other substance compares with it in resisting tension. The tempered steel pianoforte wire employed for

flying our kites resists breaking by tension at the rate of over 350,000 pounds per square inch. The same weight of aluminum of the very strongest quality would be broken by a strain of about 188,000 pounds. Aside from the difficulty of grasping it wood is also an excellent material to resist tension. Selected specimens from the strongest woods will sustain 220,000 pounds, whereas the same weight of fine tempered steel will sustain 350,000 pounds. Wood subjected to tension is thus seen to be superior to aluminum, weight for weight. These comparisons are drawn between the very finest specimens of the several materials. Their respective merits stand in much the same relation, however, when we take the average specimens. Fine grades of ordinary steel for structural purposes possess a tensile strength ranging between 100,000 and 150,000 pounds per square inch. The same weight of the better grades of rolled aluminum bars sustain only about 80,000 pounds.

(b.) *Crushing strength.*—Steel is about eleven and a half times as heavy as ash and hickory, and about eleven times the weight of white oak, weight for weight. These woods, under compression, crush with strains of about 69,000, 77,000, and 103,000 pounds, respectively; similarly the light woods, white pine and spruce, crush at about 80,000 pounds. Aluminum, therefore, is strikingly inferior to ordinary steel and hickory, and is practically on a par with pine and spruce, at least as far as general strength is concerned, while the woods are probably superior as regards elasticity. Under tension woods are equal to the best grades of steel of tensile strength exceeding 150,000 pounds per square inch. Wood, however, can not be practically employed to advantage under tension.

These general comparisons of strength are instructive and very important, but we must also take into account some other factors upon which the suitability of a given material depends. While steel is so eminently superior to all other materials for light and strong construction, it can not be easily and cheaply procured in the appropriate forms nor in the small sizes required for use in the construction of kites of the ordinary dimensions. Even were steel of the desired form available, its use in small frames would prove troublesome and inconvenient, on account of the constructional difficulties in securely uniting and framing parts together when formed probably of tubes with very thin walls. For kites of very large size, however, steel is undoubtedly the lightest and strongest material available for the framework, while for kites of the ordinary sizes there is probably nothing so light and strong, so inexpensive and easily procured, or so readily worked into almost any form of framework as the ordinary grades of white pine and spruce. Bamboo is very light, strong, and elastic, but its application is seriously limited by its peculiar form, which admits of little or no variation without impairing the strength of the material.

The foregoing considerations leave little room for question as to which materials are best suited in general for kite construction. The weight and strength of the materials mentioned above are summarized in Table VIII.

The relative strength of the several materials is computed with reference to their weight as compared with that of steel. Thus, if the tensile strength of steel is 100,000 pounds per square inch of cross section, then the tensile strength of a piece of aluminum of the larger cross section necessary to preserve the same length and *weight*, rated at 28,000 pounds tensile strength per square inch, will be 81,000 pounds. The sectional area of the aluminum bar will be 2.89 square inches.

Every designer of kites who wishes to attack his problem in a scientific and engineering manner will find a fund of valuable additional information concerning "The materials of æronautical engineering" in an article under this title by Prof. R. H. Thurston, of Cornell University, published in the Proceedings of the International Conference on Ærial Navigation, Chicago, 1893.

TABLE VIII.—*Weight and relative strength of materials.*

Material.	Weight, pounds.	Relative strength.	
		Tension.	Compression.
	Per sq. ft.	*Pounds.*	*Pounds.*
Silk	.0084	....	....
Nainsook	.0126	....	....
Lonsdale cambric	.0187	....	....
Muslin	.0220	....	....
Light silk balloon fabric (for models)	.0076	....	....
Light cotton balloon fabric	.0218	....	....
Regular balloon fabric, cotton	.0420	....	....
Sheet aluminum 0.01 inch thick	.1414	....	....
Sheet steel 0.01 inch thick	.406	....	....
Aluminum wire gauze, fine	.094	....	....
Aluminum wire gauze, heavy	.250	....	....
Vulcanized, fiber 0.01 inch thick	.065	....	....
Hard rubber, per each 0.01 inch thick.	.063	....	....
Sheet celluloid, 0.01 inch thick	.064	....	....
Tempered steel pianoforte wire	....	325,000-400,000	....
Hard spring phosphor bronze wire	....	106,000-150,000	....
Aluminum wire	....	87,000-188,000	....
Cable laid twine	....	84,000-109,000	....
	Per cu. ft.		
High grade steel, bars	490	100,000-150,000	....
Aluminum bars	169	81,000	....
Ash	43	114,000-171,000	52,000- 91,000
Hickory	43	114,000-160,000	91,000-112,000
White oak	43	114,000-........	68,000- 91,000
White pine	29	51,000-127,000	51,000-101,000
Spruce	31	79,000-158,000	71,000- 95,000

NOTE.—The relative strengths in the above table were compiled from Thurston's tables.

(2) *How given materials are best employed* in the construction of kites is a very interesting point, and will next receive a brief consideration. We have already been led to the conclusion that wood (white pine or spruce) is probably the best and most available material for the frame work of kites of moderate size. The strength of a given piece of material depends very much upon the manner in which it is strained. The principal strains that are likely to occur are lateral bending and compression. Shearing and torsional strains may also exist in some cases. Comparatively slight forces are sufficient to break a stick by flexure whereas the same stick will sustain far greater forces which tend to compress it. In devising the strongest and lightest construction, we must, therefore, avoid as far as possible subjecting the material to lateral bending strains. By a well known artifice of construction, it will nearly always be practicable to substitute for large bending strains two other forces or strains. One of these will be compression, the other tension. Thus the slender stick, *A B*, Fig. 64, supported at each end, is unable alone to sustain any considerable load distributed over its length. If, however, a short column, *C*, and the tension members, *T T*, be introduced, the character of the strains are entirely changed. The stick *A B* and the column *C* will now be under compression, while *T* and *T* will be put under tension by loading, and the strength of the devise is enormously increased, as every one knows. The stick is still subjected to bending strains at points between the extremities and the foot of the column *C*, but the accumulated strains on a section and its length are both half as great as in the case of the whole bar, circumstances that contribute in still greater proportion to increase the strength.

This artifice of the truss is of unlimited application in kite construction where lightness and strength are so important. The principal strains in the frame work will by this means be compression and tension, the former sustained by wooden trusses the latter by slender wires, whose weight will generally be of very little importance. Wires of hard drawn phosphor bronze resist corrosion by moisture, etc., better than steel and will in many cases probably be preferable to steel which is very much stronger.

A wide field is open for the display of ingenuity in devis-

ing the best methods of working out the details of construction, that is, the best arranged forms of the several parts, how to conveniently and securely unite them, etc., remembering always that the frame work must possess that happy quality, uniform strength. The final solution of these difficulties can not be stated yet. The writer has endeavored to point out a few important principles and has indicated the lines along which it seems the work may best proceed, but many ingenious minds by repeated experimentation must achieve new improvements before it can be said that the best has been attained.

(Concluded in the July REVIEW.)

NOTES BY THE EDITOR.

MEXICAN CLIMATOLOGICAL DATA.

In order to extend the isobars and isotherms southward so that the students of weather, climate and storms in the United States may properly appreciate the influence of the conditions that prevail over Mexico the Editor has compiled the following table from the Boletina Mensual for April, 1896, as published by the Central Meteorological Observatory of Mexico. The data there given in metric measures have, of course, been converted into English measures. The barometric means are as given by mercurial barometers under the influence of local gravity, and therefore need reductions to standard gravity, depending upon both latitude and altitude; the influence of the latter is rather uncertain, but that of the former is well known. For the sake of conformity with the other data published in this REVIEW these corrections for local gravity have not been applied.

Mexican data for April, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	%	*Inch.*		
Aguascalientes	6,112.3						
Campeche	40.4						
Colima (Seminario)		28.27	77.9	61	0.00	ssw.	w.
Colima	1,291.7		80.2				
Culiacan	112.2						
Guadalajara (H. de B.)	5,141.2						
Guadalajara (Obs. d. Est.)	5,186.4	24.97	73.8	81	4.92	sw.	
Guanajuato	6,761.3	23.64	71.2	38	1.00	ene.	sw.
Jalapa	4,757.3	25.56	68.0	75	1.72	e.	
Lagos (Liceo Guerra)		24.13	71.1	39	0.70	ne.	sw.
Leon	5,901.0	24.28	72.5	34	0.30	*	†
Mazatlan	24.6	29.92	73.8	75	0.00	nw.	sw.
Merida	50.2	29.95	81.1	59	0.00	ese.	se.
Mexico (Obs. Cent.)	7,488.7	23.08	65.5	46	0.72	n.	sw.
Mexico (E. N. de S.)	7,480.5	23.15	64.9	51	0.43	se.	
Morelia (Seminario)	6,401.0	23.95	66.7	52	1.44	sw.	w.
Oaxaca	5,164.4	25.06	74.8	51	2.43	ese.	e.
Pabellon	6,312.4						
Pachuca	7,956.3	22.58	60.6	63	1.96	nne.	
Progreso							
Puebla (Col. d. Est.)	7,118.2						
Puebla (Col. Cat.)	7,112.0	23.37	67.5	47	1.07		
Queretaro	6,069.7	24.16	70.3	46	0.20	e.	
Real del Monte (E. de H.)	9,095.2						
Saltillo (Col. S. Juan)	5,376.7	24.82	69.1	61	3.03	ssw.	n.
San Luis Potosi	6,201.9	24.10	69.3	51	0.68	e.	w.
Silao	6,063.1						
Tacambaro							
Tacubaya (Obs. Nac.)	7,620.2	22.95	63.7	51	0.70	nw.	
Tampico (Hos. Mil.)							
Tehuacan	5,152.8						
Toluca	8,612.4	21.92	62.4	49	1.19	wsw.	se.
Trejo (Hac. Silao, Gto.)					3.59		
Trinidad (near Leon)	6,010.1						
Veracruz	47.9						
Zacatecas	8,015.2	22.54	67.6	34	0.00	sw.	sw.
Zapotlan (Seminario)	5,124.8	25.05	73.4		0.54	sw.	w.

* Wsw. and ssw. † Sw. and e.

Mexican data for May, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	%	*Inch.*		
Aguascalientes	6,112.3						
Campeche	40.4						
Colima (Seminario)	1,291.7	28.26	80.4	63	0.94	ssw.	w.
Colima	1,291.7		82.2				

Mexican data for May, 1896—Continued.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction.	
						Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	%	*Inch.*		
Culiacan	112.2						
Guadalajara (H. de B.)	5,141.2						
Guadalajara (Obs. d. Est.)	5,188.0						
Guanajuato	6,761.3	23.66	72.7	36	0.72	ene.	e.
Jalapa	4,757.3	25.53	71.4	75	2.97	nnw.	
Lagos (Liceo Guerra)	6,274.5						
Leon	5,901.0	24.27	76.1	31	0.28	*	†
Mazatlan	24.6	29.89	77.7	78	0.00	w.	sw.
Merida	50.2	29.88	85.1	60	1.12	ese.	e.
Mexico (Obs. Cent.)	7,488.7	23.07	67.6	47	0.47	n.	‡
Mexico (E. N. de S.)	7,480.5	23.05	67.6	50	0.46	se.	
Morelia (Seminario)	6,401.0	23.94	69.6	50	0.48	s.	ne.
Oaxaca	5,164.4	25.05	77.5	53	2.69	se.	ne.
Pabellon	6,312.4						
Pachuca	7,956.3	22.58	68.3	59	0.41	ne.	
Progreso							
Puebla (Col. d. Est.)	7,118.2						
Puebla (Col. Cat.)	7,112.0	23.37	69.6	54	3.99		
Queretaro	3,069.7	24.17	72.1	47	0.37	e.	
Real d. Monte (E. de H.)	9,095.2						
Saltillo (Col. S. Juan)	5,376.7	24.85	76.5	53	1.93	n.	sw.
San Luis Potosi	6,201.9	24.11	73.0	49	0.59	e.	w.
Silao		24.18	76.1	60	0.10	sw.	ne.
Tacambaro							
Tacubaya (Obs. Nac.)	7,620.2						
Tampico (Hos. Mil.)							
Tehuacan	5,152.8						
Toluca	8,612.4	21.91	62.8	45	0.34	wsw.	ne.
Trejo (Hac. Silao, Gto.)							
Trinidad (near Leon)	6,010.1						
Veracruz	47.9	29.94	82.9	76	0.88	se.	se.
Zacatecas	8,015.2	22.54	69.8	35	0.18	w.	e.
Zapotlan (Seminario)	5,124.8						

* W. and wsw. † N., e., and ne. ‡ Ne. and nw.

KITES, BALLOONS, AND CLOUDS.

The excellent series of investigations bearing on the theory and practice of flying kites for meteorological purposes now being published in the MONTHLY WEATHER REVIEW will, we hope, stimulate many others to enter this fascinating and important field of work. Kite flying was apparently first practised for meteorological purposes in the United States by Benjamin Franklin, 1752. Then came a long interval up to the work done by the Kite Club of Philadelphia in 1837, as referred to by Espy, and again a long interval until Mr. Eddy began his work at Bayonne in 1890; although, perhaps in justice to himself, the Editor may remark that in July, 1876, having for the first and only time in his life a chance to spend a week on the Jersey coast, he then flew kites at Ocean Beach and Asbury Park in order to determine the depth of the sea breeze, and had the pleasure of seeing the kite which had been borne landward by the sea breeze soon reach the upper return current and be borne seaward by it. (See Preparatory Studies, p. 92.)

Mr. McAdie's experiments of 1885 and 1892 at Blue Hill in using the balloon for studies in atmospheric electricity, and especially the work done by him and Mr. Potter in Washington in 1894 and 1895, were promptly followed by encouraging action on the part of the Chief of the Weather Bureau, and in his first publication, Professor Moore expressed his intention to prosecute explorations in the upper air by all possible means. The excellent results thus far attained by Professor Marvin are, we hope, but an earnest of the future work at Washington.

On the other hand, it is desirable that similar explorations by kites be carried on in very many portions of the North American continent, and we take great pleasure in stating that not only is such work now being done at Blue Hill Observatory, but also by Messrs. Hammon and McAdie at San Francisco, and Mr. Coe, voluntary observer at Kipp, Teton Co., Mont. (W. 112° 30', N. 48° 40').

We hope soon to be able to lay before our readers a full account of the work done by these gentlemen and that many others profiting by the published results of Professor Marvin's work will construct for themselves cellular kites and determine the altitudes of the clouds and the directions of the upper winds, even if they can not get continuous records of temperature and pressure.

To those who prefer the use of the balloon for atmospheric exploration we can reccommend the ordinary toy balloon of the larger size. These can be purchased by the gross of the wholesale dealers in New York City at about two cents apiece. Larger ones made of paper, up to twelve feet in diameter, can also be made. The homemade, hot air balloon, constructed by pasting together a few sheets of tissue paper and filling with hot air from coal oil burning on a saturated sponge, will ascend to considerable heights and give an accurate idea of the motion of the lower currents of air.

To those who do not readily take to the construction of mechanical devices the most minute observation of the motions and changes going on in the clouds themselves offers a fascinating field of study. Those observers who live on mountains and in the plateau regions should be especially on the lookout for what are called phosphorescent clouds which, in Europe, appear to be seen mostly in the summer time, late at night, in the northern sky. If two or three neighboring observers would agree to observe the apparent angular altitude of cirrus and other high clouds, especially those of peculiar forms, they would thus accumulate the material for calculating the altitude in miles and the true velocity of such clouds and add an important item to our scanty knowledge of this subject.

Observers on mountain tops have opportunity for making many valuable studies of the surrounding air, and we hope that those who are thus favored will communicate through our columns the result of their work to others.

METEOROLOGICAL TABLES.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of these tables and charts see p. 16.

TABLE I.—*Climatological data for Weather Bureau Stations, June, 1896.*

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure in inches: Mean pressure, 8 a.m. and 8 p.m. ÷ 2.	Pressure: Mean reduced.	Pressure: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. ÷ 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Humidity and precipitation: Mean temperature of the dew-point.	Humidity: Mean relative humidity, per cent.	Precipitation, in inches.	Precipitation: Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station: Absolute maximum.	Year.	Absolute minimum.	Year.
New England.						62.4	− 0.1										2.85	− 0.1														
Eastport	76	24	29.83	29.92	− .01	56.3	+ 1.0	80	19	65	40	8	48	33	47	75	2.71	− 0.8	11	6,011	s.	29	s.	26	4	22	4	5.5	88	1888	30	1875
Portland, Me	103	25	29.82	29.92	− .02	62.6	+ 0.3	90	20	71	47	3	54	35	54	75	2.23	− 1.1	10	5,370	s.	27	s.	28	8	10	12	6.2	96	1888	42	*
Northfield	872	10	29.04	29.96	+ .03	59.9	− 1.2	86	5	72	36	3	48	43	50	70	1.62	− 1.9	8	6,368	s.	36	nw.	29	5	15	10	6.3	92	1892	30	*
Boston	125	26	29.83	29.96	.00	66.1	+ 0.2	92	21	74	49	*	58	30	54	70	2.71	− 0.4	9	7,572	w.	38	ne.	14	13	8	9	4.8	98	1874	44	*
Nantucket	14	10	29.97	29.98	− .02	61.2	+ 0.6	79	19	67	50	6	55	23	56	85	2.43	− 0.4	10	7,060	sw.	35	e.	14	14	8	8	4.6	89	1895	43	*
Woods Hole	......	19	......	......	......	62.0	− 0.5	76	22	67	49	15	57	17	......	......	3.62	+ 1.1	6	9,278	s.	40	ne.	15	14	9	7	4.2	85	*	45	*
Vineyard Haven	......	10	......	......	......	65.3	− 0.8	86	19	73	50	*	58	23	......	......	3.59	+ 1.3	6	......	sw.	....	......	...	7	11	12	....	92	1888	44	*
Block Island	27	16	29.96	29.99	.00	61.9	+ 0.3	78	22	68	50	15	56	19	57	87	3.97	+ 0.7	11	9,802	sw.	64	e.	14	6	15	9	5.9	86	1893	46	*
Narragansett Pier	......	15	......	......	......	63.6	− 1.0	85	22	72	46	*	55	23	......	......	3.36	+ 0.9	7	......	sw.	....	......	...	16	3	11	....	92	1893	40	1891
New Haven	107	24	29.86	29.98	− .01	65.2	− 0.1	89	22	74	50	11	56	26	57	76	2.96	0.0	11	5,520	sw.	35	n.	14	12	7	11	5.1	96	1893	41	1884
Mid. Atlan. States.						70.6	− 0.8										4.43	+ 0.7														
Albany	85	23	29.89	29.98	+ .03	67.7	− 0.1	91	20	78	47	3	58	31	56	71	2.49	− 1.2	10	5,557	s.	25	se.	6	10	13	7	5.3	96	*	40	1878
New York	314	26	29.66	29.99	.00	66.5	− 1.8	87	22	74	51	15	59	22	58	80	6.38	+ 3.2	11	7,811	nw.	40	nw.	11	10	13	7	5.0	96	*	47	*
Harrisburg	377	8	29.59	29.99	− .02	69.0	− 1.5	89	*	78	50	3	60	27	61	78	3.82	− 0.4	14	3,888	w.	39	w.	21	9	11	10	5.5	97	1895	43	1891
Philadelphia	117	26	29.87	29.99	− .01	70.4	− 1.4	91	20	79	54	*	62	25	58	68	4.07	+ 0.9	11	6,391	sw.	32	n.	14	8	7	15	6.3	98	1893	47	1884
Baltimore	142	26	29.84	29.99	− .01	71.3	− 1.0	93	21	79	54	*	63	24	60	69	3.94	− 0.1	13	4,955	sw.	30	s.	8	6	11	13	6.3	98	*	47	*
Washington	112	26	29.89	30.01	.00	71.3	− 0.2	92	20	80	52	3	63	26	61	75	2.39	− 1.6	13	3,762	s.	26	nw.	9	9	13	8	5.6	102	1874	45	1891
Cape Henry	......	23	......	......	......	73.8	+ 1.3	96	22	81	58	17	67	26	......	......	5.09	+ 1.4	10	......	se.	....	......	...	9	10	11	....	99	1895	48	1887
Lynchburg	685	26	29.30	30.02	.00	71.8	− 2.4	90	26	80	55	15	63	26	64	80	3.82	+ 0.4	18	2,326	sw.	19	nw.	22	8	10	12	5.8	98	1887	45	1889
Norfolk	57	26	29.95	30.01	− .01	73.8	+ 0.3	91	22	81	60	4	66	23	66	80	7.91	+ 3.7	15	5,181	se.	34	nw.	17	6	11	13	6.1	102	1874	49	1894
S. Atlantic States.						77.0	+ 0.1										4.72	− 0.4														
Charlotte	773	18	29.21	30.01	− .02	74.1	− 1.7	96	26	83	55	14	65	26	63	74	3.35	− 1.2	9	4,076	ne.	24	w.	28	7	17	6	5.0	102	1887	45	1889
Hatteras	11	16	30.02	30.03	.00	75.2	+ 1.7	83	29	79	66	4	71	14	69	82	2.34	− 2.2	15	7,765	sw.	36	w.	13	7	13	10	5.4	91	*	56	1884
Kittyhawk	9	22	30.01	30.02	+ .01	74.2	+ 0.6	91	22	80	61	1	69	18	68	84	3.62	− 1.0	9	8,999	ne.	37	w.	9	13	10	7	4.7	99	1880	52	*
Raleigh	388	10	29.62	30.03	.00	74.6	− 0.2	92	25	83	58	14	66	24	65	77	3.41	− 2.0	13	3,594	sw.	26	nw.	9	5	12	13	6.2	102	1887	46	1894
Wilmington	78	26	29.95	30.03	.00	76.1	− 0.4	91	25	83	61	14	69	20	69	82	5.37	− 0.3	18	5,250	sw.	42	w.	13	2	19	9	6.2	100	*	52	1878
Charleston	52	26	30.00	30.05	+ .01	78.8	0.0	94	26	85	64	14	73	22	71	81	7.57	+ 1.9	16	5,675	sw.	35	se.	3	3	22	5	5.9	100	*	51	1889
Columbia	......	10	......	......	......	78.6	+ 0.5	99	28	89	56	14	68	30	......	......	3.26	− 0.8	13	......	sw.	....	......	...	9	11	10	....	102	*	47	1889
Augusta	180	25	29.83	30.02	+ .01	78.8	0.0	99	26	89	58	14	69	26	66	73	3.61	− 1.0	15	3,597	se.	30	n.	30	8	15	7	5.4	103	1887	46	1886
Savannah	98	26	29.93	30.04	.00	79.6	+ 0.8	99	26	88	64	14	71	25	70	79	5.31	− 1.3	15	4,679	s.	27	ne.	30	7	7	16	7.1	100	*	50	1889
Jacksonville	43	25	29.99	30.04	.00	79.9	− 0.1	97	26	88	66	14	72	23	70	79	9.41	+ 4.0	14	5,116	s.	32	s.	9	4	18	8	6.0	100	*	54	1889
Florida Peninsula.						80.6	− 0.4										8.48	+ 2.6														
Jupiter	28	9	30.02	30.05	.00	79.2	− 0.6	88	28	84	69	14	74	17	73	85	8.92	+ 2.3	22	7,079	se.	28	sw.	27	3	9	18	7.2	95	1890	64	1889
Key West	22	26	30.02	30.04	.00	82.3	− 0.5	89	5	87	71	13	78	16	74	78	3.10	− 0.9	17	6,200	se.	23	s.	11	3	25	2	5.6	100	1886	69	*
Tampa	36	7	30.00	30.04	.00	80.2	0.0	94	25	88	69	28	73	21	73	83	13.42	+ 6.5	16	4,309	e.	30	se.	24	5	15	10	6.2	95	1891	64	*
East Gulf States.						78.5	− 0.4										6.61	+ 1.5														
Atlanta	1,131	18	28.87	30.03	− .02	75.2	− 0.5	94	26	84	55	14	66	27	64	72	2.66	− 1.6	14	6,150	nw.	34	sw.	23	16	9	5	4.0	100	1887	39	1889
Pensacola	56	17	29.95	30.01	− .02	79.2	− 0.3	94	28	86	66	17	73	22	70	76	12.46	+ 7.1	16	6,603	sw.	39	sw.	19	9	12	9	5.5	101	1894	55	1889
Mobile	57	26	29.97	30.03	+ .01	78.9	− 0.6	94	30	86	64	14	72	26	70	77	7.18	+ 1.3	16	5,074	se.	33	nw.	17	9	10	11	5.8	101	1894	50	1889
Montgomery	221	24	29.78	30.01	− .02	78.2	− 1.3	96	30	87	62	14	70	24	68	75	6.10	+ 1.4	13	3,975	sw.	25	sw.	20	11	9	10	5.3	106	1881	48	1889
Meridian	358	7	29.63	30.00	− .01	76.8	− 0.9	95	1	86	55	14	67	31	68	79	7.55	+ 2.6	14	3,650	s.	34	nw.	9	6	10	14	6.5	98	1891	46	1894
Vicksburg	254	25	29.71	29.97	− .05	79.5	+ 0.2	95	29	89	61	11	70	25	68	73	5.90	+ 1.6	9	4,448	se.	26	sw.	22	20	9	1	3.0	101	1881	52	1889
New Orleans	54	26	29.95	30.01	+ .01	80.0	− 0.2	95	29	87	69	23	73	23	70	78	8.23	+ 1.6	17	5,130	se.	30	se.	4	17	9	4	3.8	97	*	58	1889
Port Eads	......	10	......	......	......	80.2	+ 0.3	91	2	86	70	2	74	21	......	......	2.81	− 1.8	9	......	se.	....	......	...	6	11	13	....	....	.....	....	....
West Gulf States.						80.8	+ 1.3										1.50	− 2.3														
Shreveport	249	25	29.71	29.97	− .02	80.8	0.0	98	28	91	59	13	70	29	68	70	1.78	− 2.0	4	4,157	se.	33	nw.	28	17	10	3	3.6	104	1875	55	1889
Fort Smith	481	15	29.46	29.95	.00	78.4	+ 1.6	97	20	89	57	13	68	33	67	71	1.54	− 2.8	5	4,019	e.	24	sw.	8	14	11	5	3.7	101	1882	49	1894
Little Rock	302	17	29.68	29.99	+ .01	77.8	+ 0.3	96	20	87	56	13	68	29	65	69	3.22	− 1.0	8	4,602	e.	33	nw.	27	8	15	7	5.2	102	1894	51	*
Corpus Christi	20	10	29.94	29.96	− .02	80.6	0.0	94	5	86	68	17	75	20	74	80	2.19	− 0.5	3	8,855	se.	42	n.	12	22	6	2	2.4	95	1887	64	*
Galveston	42	26	29.95	29.99	.00	82.3	+ 0.6	90	10	86	73	10	78	17	72	74	0.34	− 4.5	5	7,376	s.	27	ne.	12	25	5	0	1.8	97	1875	64	*
Palestine	510	15	29.44	29.97	− .02	81.6	+ 3.1	100	28	93	58	14	71	36	67	68	0.71	− 3.5	5	4,261	s.	20	n.	30	11	18	1	4.2	100	1896	52	1892
San Antonio	704	18	29.23	29.94	− .01	84.0	+ 3.5	100	18	96	62	13	73	32	64	50	0.61	− 2.1	4	5,684	se.	52	n.	11	16	10	4	3.1	103	1883	53	1877
Ohio Val. & Tenn.						73.1	− 0.1										3.53	− 0.7														
Chattanooga	762	18	29.24	30.03	− .01	75.0	− 0.5	94	26	84	56	14	66	29	63	72	2.64	− 2.2	6	4,292	s.	33	nw.	1	9	14	7	5.3	98	1887	39	1889
Knoxville	980	26	29.00	30.02	− .01	73.7	+ 0.2	90	27	83	54	14	65	26	63	76	5.61	+ 1.5	15	3,249	sw.	23	nw.	12	9	14	7	5.3	96	*	43	1894
Memphis	399	26	29.58	29.99	.00	77.0	− 0.5	92	20	85	58	11	69	23	66	71	2.07	− 2.6	9	5,708	se.	39	w.	24	11	13	6	4.6	100	1881	58	*
Nashville	545	26	29.44	30.00	+ .01	75.5	− 0.8	92	20	83	56	12	66	27	66	71	1.82	− 2.5	9	4,230	nw.	29	nw.	1	11	13	6	5.2	99	1874	42	1894
Lexington	989	13	28.96	30.03	+ .05	72.0	− 1.7	90	20	81	53	13	63	25	62	72	3.74	− 0.7	15	6,358	s.	36	sw.	8	3	10	17	7.3	98	1888	43	*
Louisville	525	25	29.44	30.00	+ .01	74.2	+ 1.2	92	6	84	56	12	64	26	62	69	4.79	+ 0.5	10	4,837	s.	32	w.	27	9	12	9	5.5	100	*	44	1889
Indianapolis	766	26	29.19	29.99	.00	72.3	+ 1.4	94	6	82	52	2	62	27	59	65	3.09	− 1.6	9	3,554	sw.	33	nw.	8	7	14	9	5.6	100	1895	41	1894
Cincinnati	628	26	29.33	29.99	.00	73.1	+ 1.6	90	6	82	54	2	64	26	58	64	2.70	− 1.7	10	4,722	nw.	27	nw.	12	14	10	6	4.3	98	1874	39	1889
Columbus	824	18	29.13	29.99	+ .01	72.8	+ 1.3	92	25	81	48	2	60	31	58	65	3.38	− 0.1	17	3,994	e.	26	n.	13	10	11	9	5.6	99	1895	41	1894
Pittsburg	842	26	29.12	30.00	+ .01	70.4	− 0.1	89	25	80	47	2	61	27	63	80	4.79	+ 1.3	15	3,529	nw.	24	sw.	8	6	21	3	5.3	98	*	39	1879
Parkersburg	638	8	29.34	30.01	− .01	71.0	− 0.8	92	20	81	50	*	61	30	61	74	4.22	0.0	15	2,631	se.	30	w.	8	4	12	14	6.6	99	1895	42	1889
Lower Lake Region.						66.8	+ 0.8										3.68	+ 0.1														
Buffalo	768	26	29.16	29.97	+ .01	65.8	+ 2.5	85	20	74	45	*	58	35	53	64	1.46	− 2.0	8	8,159	sw.	42	w.	26	9	16	5	5.0	93	1895	39	1891
Oswego	335	26	29.59	29.95	− .01	63.0	+ 0.2	84	21	71	43	1	55	25	53	69	1.57	− 1.8	7	5,994	w.	25	n.	10	16	7	7	4.1	98	1875	40	1875
Rochester	523	25	29.42	29.97	+ .01	66.4	+ 1.3	88	7	77	44	3	56	36	53	64	2.80	− 0.4	8	5,034	sw.	27	sw.	21	19	7	4	3.3	95	*	36	1879
Erie	714	24	29.23	29.98	+ .02	66.2	+ 0.3	84	8	73	47	2	59	22	57	72	4.67	+ 0.7	11	5,830	ne.	24	ne.	10	11	16	3	4.7	92	1894	40	1894
Cleveland	740	26	29.20	29.98	.00	66.6	+ 0.3	88	25	74	45	2	59	26	59	75	6.10	+ 2.3	10	6,902	se.	41	w.	7	9	13	8	5.0	96	1874	40	1879
Sandusky	629	18	29.31	29.97	− .01	69.2	+ 0.3	90	*	77	50	1	61	24	58	70	2.94	− 1.0	9	5,106	e.	31	nw.	7	7	14	9	5.7	96	1885	40	1895
Toledo	674	26	29.27	29.97	+ .01	69.0	+ 0.5	89	6	78	47	1	60	26	58	69	2.96	− 0.5	10	5,820	e.	36	w.	25	12	12	6	4.5	99	1872	41	1894
Detroit	730	26	29.21	29.97	+ .01	67.8	+ 1.2	86	6	77	45	*	59	26	58	72	6.97	+ 3.3	13	5,635	ne.	50	w.	25	13	13	4	3.9	96	1895	38	*
Upper Lake Region.						64.0	+ 2.5										2.25	− 1.5														
Alpena	609	24	29.32	29.97	+ .03	61.6	+ 2.6	86	30	71	41	1	52	32	52	69	3.09	− 0.7	11	5,549	se.	27	w.	28	17	8	5	3.6	97	1874	34	*
Grand Haven	628	26	29.30	29.96	+ .01	66.4	+ 3.8	85	6	75	42	1	57	27	56	70	1.00	− 2.9	9	5,470	w.	26	nw.	26	15	14	1	3.5	90	*	39	*
Marquette	734	26	29.17	29.94	.00	62.0	+ 4.4	89	30	72	40	8	52	31	49	67	2.25	− 1.3	13	5,553	nw.	34	nw.	27	11	14	5	4.7	95	*	31	*
Port Huron	639	22	29.32	30.00	+ .04	65.2	+ 2.1	88	6	74	40	2	56	34	56	72	1.79	− 1.7	10	5,973	s.	39	w.	7	19	6	5	3.5	95	1895	35	1894
Sault Ste. Marie	614	8	29.30	29.96	+ .03	60.2	+ 0.4	86	18	73	37	2	48	28	51	74	1.94	− 1.2	9	5,358	nw.	32	nw.	29	19	8	3	3.5	92	1893	34	*
Chicago	824	26	29.11	29.98	+ .03	67.0	+ 0.7	89	7	74	50	9	60	26	55	69	2.82	− 1.0	12	10,228	ne.	50	sw.	7	14	14	2	3.7	98	1872	40	*
Milwaukee	673	26	29.27	29.98	+ .02	65.4	+ 2.7	89	5	74	48	1	57	33	56	73	2.08	− 2.1	9	5,522	e.	30	n.	9	11	8	11	4.9	95	1890	38	1894
Greenbay	617	10	29.32	29.98	+ .03	67.4	+ 2.9	89	21	79	42	1	56	30	54	64	3.35	+ 0.1	10	4,773	s.	34	nw.	27	6	16	8	6.2	94	*	38	*
Duluth	702	26	29.20	29.95	+ .03	61.0	+ 3.2	90	30	70	39	8	52	35	50	71	2.00	− 2.6	11	6,550	ne.	42	ne.	7	9	16	5	4.6	92	*	33	1885
North Dakota.						65.3	+ 1.0										2.90	− 0.9														
Moorhead	935	16	28.92	29.91	+ .04	65.8	+ 2.0	93	30	77	46	10	55	34	55	69	2.61	− 1.8	11	7,117	s.	36	se.	7	12	11	7	4.5	101	1893	28	1888
Bismarck	1,681	22	28.18	29.92	+ .06	65.6	+ 1.0	96	30	78	42	2	53	41	54	67	2.64	− 0.9	11	7,386	se.	47	sw.	3	19	8	3	4.0	99	1883	31	1888
Williston	1,875	18	27.94	29.87	+ .03	64.6	+ 0.1	92	30	77	40	5	52	34	53	67	3.45	0.0	11	6,477	n.	48	nw.	11	19	5	6	3.1	107	1883	30	1883
Upper Miss. Valley.						71.1	+ 0.8										3.52	− 1.1														
Minneapolis	......	7	......	......	......	69.0	0.0	90	30	79	46	9	59	31	......	......	2.60	− 1.1	9	......	s.	....	......	...	9	18	3	....	....	.....	....	....
St. Paul	850	26	29.07	29.96	+ .04	68.2	+ 0.9	89	30	78	47	9	58	28	55	66	3.30	− 1.0	9	4,646	se.	32	nw.	11	8	15	7	5.2	94	*	36	1885
La Crosse	......	24	......	......	......	69.2	+ 1.6	89	30	80	47	9	59	31	......	......	4.29	− 0.2	11	4,165	s.	28	n.	27	11	15	4	4.7	98	1874	40	1876
Davenport	613	25	29.31	29.95	.00	70.7	+ 1.2	90	20	80	50	1	62	26	59	68	2.28	− 2.1	11	5,655	e.	34	w.	7	5	11	14	6.3	98	1890	39	1889
Des Moines	869	18	29.06	29.98	+ .06	70.1	− 0.2	91	19	80	49	*	60	31	57	67	2.69	+ 2.7	11	4,718	n.	40	se.	4	7	12	11	6.1	101	1886	37	1889
Dubuque	651	23	29.28	29.96	+ .02	70.9	+ 2.3	96	20	82	49	9	59	36	57	66	3.11	− 2.1	11	3,271	se.	32	sw.	6	7	20	3	5.5	98	1874	40	1877
Keokuk	613	25	29.33	29.97	+ .03	72.1	+ 1.3	91	24	82	49	12	63	27	60	69	2.18	− 2.4	12	4,533	s.	30	nw.	12	7	16	7	5.0	98	1890	43	1889
Cairo	359	25	29.60	29.98	+ .01	74.4	− 0.1	89	20	82	58	11	67	21	67	79	4.73	+ 0.3	11	5,012	s.	40	s.	6	6	15	9	5.6	96	*	46	*
Springfield, Ill.	644	17	29.31	29.97	.00	72.2	+ 1.4	91	25	82	54	1	63	26	61	71	6.45	+ 2.0	12	5,233	sw.	28	w.	7	6	15	9	5.6	97	*	40	1894

TABLE I.—*Climatological data for Weather Bureau Stations, June, 1896*—Continued.

Stations.	Elevation above sea-level, feet.	Length of record, years.	Pressure, in inches. Mean pressure, 8 a.m. and 8 p.m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. and min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Humidity and precipitation. Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Monthly temperature data since opening station. Absolute maximum.	Year	Absolute minimum.	Year
Up. Miss. Val.—Con																																
Hannibal	534	....	29.41	29.96	......	71.5	......	90	19	81	51	12	62	30	62	73	2.40	− 2.4	12	5,248	sw.	44	ne.	17	12	10	8	4.7	....	....	....	....
St. Louis	571	26	29.40	30.00	+ .04	74.0	− 0.3	91	20	83	56	10	65	26	64	73	4.57	− 0.5	15	5,886	s.	52	nw.	21	10	13	7	5.1	99	*	44	1894
Missouri Valley.						71.0	− 0.3										3.18	− 1.3														
Columbia	......	7	......	......	......	72.8	− 2.1	93	24	83	49	*	62	35	......	......	4.33	− 0.2	11	4,522	se.	32	nw.	11	9	8	13	5.9	100	1890	43	1894
Kansas City	963	8	29.00	30.00	+ .06	72.2	− 1.3	92	18	81	50	12	63	29	61	71	2.04	− 2.9	11	4,646	ne.	32	nw.	11	9	11	10	5.4	97	1890	48	1892
Springfield, Mo	1,324	11	28.61	29.98	+ .02	72.0	− 1.1	89	24	81	50	12	63	28	63	77	2.81	− 1.4	10	5,490	s.	25	sw.	25	13	12	5	3.9	98	1882	46	1882
Topeka	......	10	......	......	......	73.0	+ 0.3	93	18	84	48	12	62	33	......	......	3.19	− 2.5	11	......	se.	....	......	...	9	10	11	....	100	1887	36	1888
Omaha	1,123	26	28.82	29.98	+ .05	72.0	+ 0.7	94	18	82	49	9	62	27	57	64	1.90	− 3.8	10	5,250	se.	35	nw.	11	5	16	9	5.7	98	*	42	1877
Sioux City	1,165	7	......	......	......	69.6	− 1.2	93	18	81	46	2	58	33	......	......	2.94	− 0.5	12	6,891	ne.	56	sw.	6	12	11	7	4.6	100	1894	41	1894
Pierre	1,470	22	28.38	29.90	+ .04	70.6	+ 2.3	97	30	83	46	1	58	37	53	57	2.76	− 0.6	10	7,786	se.	52	sw.	6	9	18	3	4.7	111	1874	36	1885
Huron	1,310	15	28.57	29.93	+ .03	66.2	− 0.1	91	30	79	40	2	54	35	54	67	5.18	+ 1.6	9	8,904	se.	56	sw.	7	11	14	5	4.6	98	1894	31	1894
Northern Slope.						65.4	+ 1.8										1.89	− 0.8														
Havre	2,477	14	27.31	29.85	− .01	64.0	+ 1.7	97	30	78	42	12	50	44	46	58	3.02	0.0	13	4,648	w.	38	w.	10	17	11	2	3.4	101	1883	31	1883
Miles City	2,372	19	27.42	29.84	− .01	68.0	+ 1.0	98	30	83	41	12	53	49	48	55	1.86	− 1.2	8	5,417	e.	39	w.	3	17	8	5	3.7	104	1881	38	*
Helena	4,108	17	25.85	29.95	+ .05	63.2	+ 2.4	88	29	76	39	7	51	36	37	43	0.71	− 1.7	8	5,757	sw.	36	sw.	10	17	12	1	3.2	95	1880	31	1880
Rapid City	3,260	12	26.61	29.89	+ .05	67.5	+ 4.2	92	17	81	43	25	54	40	46	50	3.35	− 0.5	11	7,668	s.	47	sw.	3	6	18	6	5.7	103	1893	35	1883
Cheyenne	6,105	26	24.09	29.89	+ .03	62.8	+ 1.5	88	10	76	39	1	50	39	44	53	1.41	− 0.1	8	6,822	s.	40	nw.	6	10	18	2	4.9	97	*	28	1876
Lander	5,372	13	24.70	29.95	+ .09	63.2	+ 1.4	88	15	79	36	11	47	46	38	47	0.12	− 1.1	4	3,256	nw.	36	w.	16	7	23	0	5.0	91	1888	29	1895
North Platte	2,826	22	27.10	29.95	+ .06	69.1	+ 0.5	94	16	82	43	8	56	44	56	68	2.76	− 0.7	9	6,746	se.	44	sw.	23	9	21	0	4.5	101	1876	33	1876
Middle Slope.						73.3	+ 1.3										2.63	− 0.5														
Denver	5,290	25	24.80	29.94	+ .10	68.2	+ 1.6	92	*	83	44	2	53	42	41	48	0.89	− 0.5	9	5,278	s.	36	ne.	24	5	22	3	5.0	99	1878	36	1892
Pueblo	4,713	8	25.30	29.91	+ .08	72.0	+ 1.2	99	10	88	45	*	56	46	36	36	0.35	− 0.9	4	5,841	nw.	42	n.	11	14	13	3	4.2	103	1888	38	1892
Concordia	1,410	12	28.50	29.95	+ .04	73.0	+ 0.7	98	14	85	48	2	61	38	50	66	2.12	− 2.3	14	4,638	s.	28	s.	4	16	11	3	3.4	101	*	43	1892
Dodge City	2,504	22	27.38	29.89	+ .03	76.2	+ 3.6	104	14	90	46	2	62	40	54	55	1.98	− 1.4	6	9,052	se.	47	se.	5	18	10	2	3.6	106	1893	41	1876
Wichita	1,351	8	28.56	29.95	+ .07	74.2	+ 0.7	98	14	85	48	12	63	37	60	66	7.10	+ 1.8	10	4,920	se.	42	n.	17	12	12	6	4.1	101	*	46	*
Oklahoma	1,239	6	28.70	29.97	+ .05	76.2	− 0.2	100	15	87	50	12	65	33	66	76	3.32	+ 0.2	11	6,318	se.	48	ne.	17	20	8	2	3.0	102	1893	42	1892
Southern Slope.						......	......										......	......														
Abilene	1,749	11	28.15	29.90	− .02	83.1	+ 5.0	105	8	96	56	13	71	35	57	49	2.17	− 1.1	6	6,921	se.	30	nw.	11	16	12	2	3.4	109	1886	48	1892
Amarillo	3,691	5	26.27	29.90	.00	76.0	......	90	17	89	51	12	63	41	49	49	2.31	......	8	12,679	s.	64	n.	9	7	15	8	5.5	102	1893	48	1894
Southern Plateau.						82.0	+ 3.3										0.32	0.0														
El Paso	3,767	19	26.15	29.83	+ .01	81.6	− 0.3	108	16	95	50	3	68	40	35	27	0.60	+ 0.2	1	8,030	nw.	46	sw.	20	20	6	4	2.7	113	1883	50	*
Santa Fe	6,998	23	23.36	29.89	.00	69.0	+ 3.7	89	16	81	48	4	57	32	23	25	0.69	− 0.2	4	5,335	sw.	31	sw.	23	15	15	0	3.6	92	1881	33	*
Phœnix	1,106	....	28.64	29.76	......	88.4	+ 5.7	115	*	105	61	5	72	43	43	26	T.	− 0.1	0	3,642	w.	24	se.	25	27	1	2	1.3	....	....	......	....
Yuma	139	21	29.58	29.72	− .06	88.8	+ 4.0	117	12	106	63	4	72	39	48	34	0.00	0.0	0	4,790	sw.	32	sw.	18	30	0	0	0.2	117	1896	52	*
Middle Plateau.						68.5	+ 3.0										0.22	− 0.6														
Carson City†	4,720	9	25.30	29.95	......	64.3	+ 4.2	88	15	80	41	3	48	42	35	43	0.12	− 0.3	1	......	w.	....	......	...	19	11	0	2.3	92	*	27	1894
Winnemucca	4,340	17	25.65	29.90	+ .02	67.0	+ 4.2	90	28	82	41	10	52	44	27	28	0.18	− 0.6	3	7,191	sw.	39	s.	15	18	10	2	2.4	98	1887	29	1880
Salt Lake City	4,344	23	25.63	29.90	+ .02	70.0	+ 1.9	93	15	83	44	11	57	36	42	40	0.25	− 0.5	2	4,460	nw.	30	s.	26	9	17	4	5.1	100	1883	37	1875
Northern Plateau.						63.2	+ 1.8										0.94	− 0.5														
Baker City	3,430	7	26.46	29.92	+ .02	59.6	+ 3.1	90	28	72	34	10	47	40	42	59	1.49	0.0	6	3,596	s.	19	e.	11	16	8	6	4.0	99	1892	27	1892
Idaho Falls	4,742	7	25.26	29.94	+ .06	62.4	+ 2.8	91	30	79	33	11	46	46	40	52	0.65	− 0.6	5	5,706	s.	36	s.	10	16	9	5	4.4	91	1896	33	1896
Spokane	1,930	16	27.97	29.97	+ .05	62.9	− 0.2	96	28	76	40	11	50	37	37	47	0.73	− 0.9	6	4,427	sw.	30	se.	29	13	11	6	4.5	96	*	34	1891
Walla Walla	1,018	11	28.92	29.98	+ .05	67.8	+ 1.4	105	28	81	44	6	54	43	48	54	0.88	− 0.5	6	4,281	s.	22	sw.	9	21	8	1	3.1	105	1896	40	1892
N. Pac. Coast Reg.						56.9	− 0.8										2.35	− 0.4														
East Clallam	......	....	......	......	......	53.4	......	90	26	61	37	13	45	43	......	......	2.85	......	11	......	w.	....	......	...	15	2	13	....	....	....	......	....
Fort Canby	179	13	29.92	30.11	+ .11	56.4	+ 0.6	88	25	62	46	2	51	29	50	84	2.70	+ 0.1	9	7,373	nw.	54	se.	7	12	10	8	5.1	91	1887	44	*
Neah Bay	......	12	......	......	......	54.5	− 1.9	71	26	63	38	1	46	24	......	......	4.49	− 0.5	11	......	w.	....	......	...	5	11	14	....	77	1893	36	1891
Port Angeles	29	12	30.04	30.07	+ .08	53.8	− 0.2	83	26	61	40	13	47	29	45	77	0.31	− 1.0	6	5,250	w.	27	sw.	12	12	12	6	4.7	83	1896	35	1887
Port Crescent	......	....	......	......	......	55.1	......	93	26	66	39	*	44	46	......	......	1.45	......	6	......	w.	....	......	...	12	13	5	....	....	....	......	....
Pysht	......	....	......	......	......	56.4	......	85	26	67	37	13	46	36	......	......	2.61	......	10	......	w.	....	......	...	12	5	13	....	....	....	......	....
Seattle	119	....	29.93	30.06	......	60.2	......	93	26	69	45	14	51	35	46	66	0.77	......	7	3,789	s.	20	s.	8	14	11	5	4.3	....	....	......	....
Tatoosh Island	86	13	29.99	30.09	+ .09	53.0	− 0.9	69	26	57	46	6	49	16	49	85	3.89	− 0.2	14	6,009	w.	36	s.	27	5	7	18	7.2	75	1890	34	1890
Astoria	......	12	......	......	......	57.8	− 0.2	84	25	65	43	2	50	26	......	......	3.35	+ 0.2	10	......	w.	....	......	...	15	9	6	....	88	*	42	1891
Portland, Oreg	157	25	29.90	30.07	+ .02	61.2	− 2.1	90	26	70	43	10	52	31	47	64	1.41	− 0.4	8	5,646	nw.	29	s.	7	16	11	3	3.9	99	1876	39	1875
Roseburg	523	19	29.47	30.03	− .03	61.4	− 0.6	98	25	74	37	10	48	46	46	64	0.27	− 1.0	3	3,312	nw.	20	n.	22	15	6	9	4.0	98	1896	36	1893
Mid. Pac. C'st Reg.						62.3	+ 0.1										0.10	− 0.4														
Eureka	64	10	30.03	30.09	+ .05	54.0	− 1.0	64	7	60	44	10	48	18	48	84	0.51	− 0.8	5	5,949	nw.	38	nw.	23	10	18	2	4.3	73	1891	40	1887
Redbluff	334	19	29.54	29.88	− .01	77.4	+ 3.1	102	16	91	50	3	64	34	43	35	T.	− 0.5	0	5,345	nw.	36	nw.	23	25	3	2	1.9	110	1891	46	*
Sacramento	71	19	29.81	29.88	− .03	71.5	+ 2.5	99	16	85	46	3	58	36	52	58	0.00	− 0.2	0	6,916	sw.	30	nw.	10	21	8	1	2.1	106	1891	44	1890
San Francisco	153	26	29.80	29.96	.00	57.2	− 2.6	79	15	64	47	13	51	29	49	79	0.00	− 0.2	0	10,290	w.	42	w.	1	18	10	2	3.0	100	1891	47	*
Point Reyes Light	......	8	......	......	......	51.6	− 1.6	65	23	56	45	*	47	18	......	......	0.00	− 0.5	0	......	nw.	....	......	...	13	8	9	....	86	1891	38	1892
S. Pac. Coast Reg.						70.8	+ 1.7										0.00	− 0.1														
Fresno	332	9	29.49	29.84	− .04	78.6	+ 3.3	106	14	95	47	3	62	40	44	38	0.00	− 0.1	0	5,309	nw.	24	sw.	2	27	3	0	1.1	112	1891	46	1890
Los Angeles	330	19	29.55	29.90	− .04	69.0	+ 1.9	99	13	80	48	4	58	38	56	73	T.	− 0.1	0	2,477	w.	13	sw.	4	9	21	0	3.2	104	1879	46	*
San Diego	69	25	29.84	29.92	− .03	64.8	− 0.2	89	13	70	54	4	59	26	57	80	0.01	0.0	1	3,828	sw.	17	w.	9	16	3	11	4.2	89	1896	50	*
San Luis Obispo	201	....	29.74	29.96	......	63.8	......	93	10	78	43	3	50	46	49	70	T.	......	0	3,518	w.	16	w.	4	20	9	1	2.9	....	....	......	....

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more directions, dates, or years. † Received too late to be considered in district averages, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, May, 1896.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Alabama.					
Alco†	95	58	78.2	8.12	
Ashville*†[1]	100	68	77.8	3.14	
Bermuda†	93	59	77.2	6.40	
Birmingham†	94	56	76.5	4.29	
Brewton	99	63	78.7	11.00	
Carrollton*†[1]	88	62	76.2	5.02	
Citronelle†	92	65	78.6	6.17	
Clanton†	93	58	76.2	6.67	
Cordova†	......	......	......	3.21	
Daphne†	96	68	81.5	13.15	
Decatur†	95	52	75.6	3.07	
Demopolis†	......	......	......	8.43	
Elba†	......	55	......	5.09	
Eufaula *a*†	100	62	81.2	3.71	
Evergreen†	95	57	77.8	8.49	
Florence *a*†	......	......	......	4.08	
Florence *b*†	91	55	75.4	4.17	
Fort Deposit†	98	60	78.9	3.92	
Gadsden†	93	54	75.2	3.01	
Goodwater†	100	54	76.9	3.36	
Greensboro†	92	57	76.4	6.15	
Hamilton†	......	......	......	4.01	
Healing Springs†	95	58	76.0	8.06	
Highland Home†	93	61	77.3	4.11	
Livingston†	97	57	78.0	4.14	
Lock No. 4	......	......	......	4.77	
Madison Station†	97	52	74.6	4.48	
Marion†	94	61	77.2	5.59	
Mount Willing†	96	57	78.6	4.52	
Newbern†	91	68	77.4	6.10	
Newburg	93	52	74.9	2.90	
Newton†	96	61	78.4	3.04	
Oneonta†	96	50	75.8	4.42	
Opelika†	95	59	76.7	1.94	
Oxanna†	94	54	75.0	4.10	
Pineapple†	98	53	78.4	5.53	
Pushmataha†	96	59	77.7	8.34	
Rock Mills†	98	51	77.0	4.30	
Scottsboro†	99	52	75.9	2.26	
Selma†	......	......	......	5.06	
Talladega*[1 4]	90	63	77.4	......	
Thomasville	97	60	78.2	3.57	
Tuscaloosa†	99	57	78.2	6.99	
Tuscumbia†	93	58	76.7	4.80	
Union†	95	55	76.8	8.49	
Union Springs†	97	59	79.6	8.43	
Uniontown†	95	60	78.6	10.19	
Valleyhead†	92	48	73.2	2.68	
Wetumpka	......	......	......	6.74	
Wilsonville†	......	......	......	5.26	
Alaska.					
Killisnoo†	70	35	48.5	3.25	
Arizona.					
Arizona Canal Co. Dam	113	53	81.5	0.00	
Benson*[3]	107	73	85.2	0.00	
Bisbee†	101	60	80.8	0.45	
Buckeye†	113	56	85.3	0.00	
Calabasas†	110	47	78.8	0.85	
Casa Grande*[8]	108	74	91.2	0.00	
Dragoon	......	......	......	0.71	
Dragoon Summit*[5]	102	70	88.0	0.49	
Dudleyville†	112	53	82.4	0.03	
Eagle Pass*[2]	102	55	78.6	0.42	
Farleys Camp†	112	58	87.6	0.00	
Flagstaff†	92	35	63.2	0.00	
Fort Apache	101	40	72.0	0.52	
Fort Grant	106	49	80.2	0.90	
Fort Huachuca†	103	51	78.6	1.81	
Fort Mohave†	127	63	97.8	0.00	
Gilabend *a**[8]	118	75	95.7	0.00	
Gisela	112	48	80.6	T.	
Glendale	112	60	85.6	0.00	
Holbrook†	101	43	72.4	0.06	
Ingleside	119	60	88.8	0.00	
Maricopa*[8]	122	75	97.7	0.03	
Mount Huachuca†	108	51	80.7	0.54	
Natural Bridge†	......	......	......	0.00	
Oracle†	105	59	82.4	0.65	
Oro	......	......	......	1.18	
Oro Blanco	103	64	84.0	0.56	
Pantano*[8]	112	65	88.7	0.07	
Parker†	126	69	95.2	0.00	
Payson	......	......	......	0.00	
Peoria†	116	62	89.0	0.00	
Phœnix	111	58	84.6	0.00	
Pinal Ranch	......	......	......	0.24	
Reymert†	121	59	91.6	0.06	
San Carlos†	117	51	84.5	T.	
San Simon*[8]	107	71	88.2	0.00	
Showlow	......	......	......	0.47	
Signal†	119	59	88.3	0.00	
Sulphur Spring Valley†	......	......	......	0.17	
Texas Hill*[8]	124	70	99.5	0.00	
Tucson *c*†	110[a]	59	85.8[a]	0.19	
Walnut Ranch*†[1]	98	58	77.0	0.13	
Wells	123	58	88.6	0.01	
Arizona—Cont'd.					
Whipple Barracks†	104	41	71.2	0.14	
Willcox*[8]	108	75	89.4	0.00	
Arkansas.					
Arkansas City†	......	......	......	2.20	
Beebranch†	99	54	77.3	1.25	
Blanchard Springs†	97	51	79.6	2.24	
Brinkley†	98	54	78.4	2.87	
Camden *a*†	......	......	......	2.56	
Camden *b*†	100	49	79.0	2.57	
Conway*[8]	92	63	76.9	2.43	
Corning†	98	52	76.1	1.87	
Dallas†	100	51	77.5	1.99	
Dardanelle†	......	......	......	1.90	
Elon†	97	50	80.4	2.14	
Fayetteville†	92	51	74.6	2.06	
Forrest†	94	54	77.4	2.42	
Fulton†	......	......	......	1.63	
Gaines Landing†	......	......	......	1.00	
Helena *a*†	......	......	......	1.57	
Helena *b*†	99	56	80.4	1.09	
Hot Springs *a*	102	56	78.8	1.65	
Hot Springs *b*	......	......	......	0.18	
Hot Springs (near)	......	......	......	0.37	
Jonesboro†	92	54	76.2	2.90	
Keesees Ferry†	99	49	75.4	2.13	
Kirby†	98	52	80.2	0.80	
Lacrosse†	95	52	74.2	1.45	
Latour	......	......	......	0.91	
Lonoke*[1]	102	59	81.2	2.43	
Luna Landing*[6]	94	57	77.9	0.86	
Malvern†	103	49	79.8	0.57	
Marvell	99	56	79.3	1.75	
Mossville	90	51	72.6	2.53	
Mount Nebo†	87	57	72.6	1.11	
New Gascony*[1]	94	65	80.7	1.40	
Newport *a*†	......	......	......	3.14	
Newport *b*†	94	55	75.9	2.92	
Newport *c*†	96	50	76.5	3.65	
Osceola†	92	56	76.5	1.59	
Ozark†	98	57	79.9	1.12	
Picayune†	95	63	81.2	0.93	
Pinebluff†	99	55	79.4	1.79	
Pocahontas†	93	54	75.4	2.84	
Prescott	100	54	81.1	1.58	
Rison†	102	......	......	2.26	
Russellville†	96	53	77.8	2.40	
Silver Springs†	93	48	72.8	3.88	
Stuttgart†	96	54	77.7	4.65	
Texarkana†	94	60	79.8	0.10	
Warren†	98	54	80.2	2.54	
Washington†	......	......	......	0.32	
Wiggs	......	......	......	0.90	
Witts Springs†	88	51	72.0	2.88	
California.					
Adin	88	32	61.7	0.15	
Agnew	92	40	62.8	0.00	
Arlington Heights	108	50	73.4	0.00	
Athlone*[8]	106	59	83.4	0.00	
Azusa	......	......	......	0.00	
Ballast Point L. H.	......	......	......	0.00	
Barstow†	112	44	75.5	0.00	
Bear Valley†	......	......	......	0.00	
Berkeley	82	46	62.0	0.00	
Bishop†	96	40	70.0	0.05	
Bishop Creek*[8]	101	57	79.9	0.00	
Boca*[8]	87	35	59.1	0.25	
Bodie†	80	21	54.1	0.53	
Bowmans Dam†	......	......	......	0.11	
Caliente*[8]	101	55	81.0	0.00	
Calloway Canal†	......	......	......	0.00	
Cape Mendocino L. H.	......	......	......	0.55	
Cedarville†	87	36	63.5	0.37	
Centerville*[1]	98	56	66.1	0.00	
Chico*[8]	100	52	77.6	0.00	
Chino*†[6]	107	57	74.2	0.00	
Cisco*[8]	74	33	54.9	0.00	
Claremont†	104	42	70.3	T.	
Corning*[8]	105	52	78.1	0.00	
Coronado	87	58	66.6	0.01	
Craftonville	112	50	77.4	0.00	
Crescent City†	66	38	53.4	0.44	
Crescent City L. H.	......	......	......	0.38	
Davisville *b*	102	50	73.2	0.00	
Delano*[8]	103	61	82.3	0.00	
Delta*[8]	101	51	74.8	0.07	
Descanso*[5]	102	34	65.0	0.00	
Drytown	98	42	69.3	0.00	
Dunnigan*[8]	102	60	83.3	0.00	
Durham*[1]	98	48	72.9	0.00	
East Brother L. H.	......	......	......	0.00	
Edgwood*[8]	93	51	68.6	0.42	
Edmanton*[1]	88	38	59.2	0.00	
Escondido	109	40	72.6	......	
Fallbrook*[1]	111	53	69.0	0.00	
Folsom City *b**[1]	105	55	78.1	0.00	
Fordyce Dam	......	......	......	0.33	
California—Cont'd.					
Fort Bragg	......	......	......	0.00	
Fort Ross	......	......	......	0.00	
Georgetown†	93	40	70.4	0.00	
Glendora	......	......	......	0.00	
Goshen*[8]	105	48	74.2	0.00	
Grass Valley	......	......	......	0.13	
Greenville†	91	33	61.7	0.00	
Guinda	......	......	......	0.00	
Healdsburg*[1]	98	46	64.0	0.00	
Hollister	94	38	61.9	0.00	
Hueneme	......	......	......	0.00	
Humboldt L. H.	......	......	......	0.36	
Hydesville†	71	41	55.0	0.00	
Indio*[8]	116	70	92.4	0.00	
Iowa Hill*[1]	92	50	70.3	0.00	
Isabella*[5]	111	52	80.6	0.06	
Jackson	96	38	67.8	0.00	
Jolon	......	......	......	0.00	
Julian†	106	37	69.8	0.00	
Keeler*[8]	112	60	82.2	T.	
Keene*[8]	98	50	74.2	0.00	
Kennedy Gold Mine	100	42	71.0	0.00	
Kernville	......	......	......	0.20	
King City*[8]	104	46	65.3	0.00	
Kingsburg*[8]	103	60	82.3	0.00	
Lagrange*[5]	108	50	79.2	T.	
Laporte*†[1]	84	40	60.1	0.00	
Lemoore *a**[8]	105	56	82.5	0.00	
Lick Observatory†	85	34	64.6	0.02	
Lime Kiln	108	48	80.2	......	
Lime Point L. H.	......	......	......	0.00	
Lodi	100	45	71.2	0.00	
Los Alamos†	......	......	......	0.00	
Los Gatos *b*	94	40	63.9	0.00	
McMullin*[1]	108	48	81.8	......	
Malakoff Mine*[1]	92	48	69.6	T.	
Mammoth Tank*[8]	122	75	93.8	0.00	
Manzana	105	41	73.9	0.00	
Mare Island L. H.	......	......	......	0.00	
Merced*[8]	102	57	77.8	0.00	
Middletown*†[1]	101	45	70.3	0.00	
Mills College	......	......	......	0.00	
Milton (near)*[1]	106	57	76.8	0.00	
Modesto*[8]	102	50	76.8	0.00	
Mohave*[8]	111	60	83.5	0.22	
Mokelumne Hill*[3]	......	51	74.9	0.00	
Monterey*[8]	78	50	60.2	0.00	
Mountain Home	......	......	......	1.10	
Mount Frazier†	......	......	......	0.00	
Mount Glenwood*[1]	101	56	78.0	0.00	
Mt. Lowe Observatory	......	......	......	0.00	
Mutah Flat†	......	......	......	0.00	
Napa *b*	101	42	66.1	0.00	
Needles	118	66	92.0	0.00	
Nevada City†	91	39	66.0	T.	
Newcastle *a*†	97	43	72.0	0.00	
Newhall*[8]	110	58	75.5	0.00	
Oakland *a*	83	46	61.5	0.00	
Ogilby*[8]	125	75	101.2	0.00	
Oleta*[1]	95	50	68.5	0.06	
Orangevale†	103	45	74.4	0.00	
Orland*[8]	110	50	80.6	0.00	
Oroville *b*	104	54	79.6	0.00	
Paso Robles *b*	102	40	68.4	T.	
Peachland*[1]	92	43	63.1	0.00	
Picacho	118	70	93.6	0.00	
Piedras Blancas L. H.	......	......	......	0.00	
Pigeon Point L. H.	......	......	......	0.00	
Pilot Creek	......	......	......	T.	
Placerville	99	40	69.8	0.00	
Point Ano Nuevo L. H.	......	......	......	0.00	
Point Arena L. H.	......	......	......	0.00	
Point Bonita L. H.	......	......	......	0.00	
Point Conception L. H.	......	......	......	0.00	
Point Fermin L. H.	......	......	......	0.00	
Point George L. H.	......	......	......	0.05	
Point Hueneme L. H.	......	......	......	0.00	
Point Lobos	65	47	54.6	T.	
Point Loma L. H.	......	......	......	0.00	
Point Montara L. H.	......	......	......	0.05	
Point Pinos L. H.	......	......	......	0.00	
Point Reyes L. H.	......	......	......	0.00	
Point Sur L. H.	......	......	......	0.00	
Pomona (near)	110	46	72.8	0.00	
Poway*[8]	108	58	66.0	0.00	
Quincy†	89	37	63.6	0.00	
Ravenna*[8]	112	61	81.2	0.00	
Redding *b*†	100	53	76.4	0.35	
Reedley (near)*[1]	105	62	85.2	0.00	
Represa	98	46	73.0	0.00	
Riovista	102	45	70.9	0.00	
Roe Island L. H.	......	......	......	0.00	
Rosewood	102	47	73.7	0.02	
Sacramento *a*	100	47	72.8	0.00	
Salton*[8]	128	75	100.6	0.00	
San Bernardino†	107	48	73.4	0.00	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Jacinto †	111	46	75.0	0.00	
San Jose b	94	38	62.5	0.00	
San Leandro *[1]	84	54	63.1	0.00	
San Luis L. H.	......	......	......	0.00	
San Mateo *[4]	87	55	70.0	0.00	
San Miguel *[8]	102	53	75.5	0.00	
San Miguel Island †	81	46	59.6	0.00	
Santa Ana *[5]	99	67	78.3	0.00	
Santa Barbara a	89	47	64.3	0.05	
Santa Barbara L. H.	......	......	......	0.00	
Santa Clara a *[6]	90	48	61.3	0.00	
Santa Cruz b	90	41	60.6	T.	
Santa Cruz L. H.	......	......	......	0.00	
Santa Maria	95	48	64.4	0.00	
Santa Monica *[3]	93	61	72.2	0.00	
Santa Rosa *[8]	96	54	71.8	0.00	
Saticoy †	......	......	......	0.00	
Shasta	......	......	......	0.27	
Shasta Springs †	92	36	65.0	0.35	
S. E. Farallone L. H	......	......	......	0.00	
Stanford University	92	41	63.3	0.00	
Stockton a	99	48	70.3	0.00	
Summerdale †	89	37	64.4	0.00	
Susanville †	96	48	69.3	T.	
Sutter Creek *[5]	96	40	67.2	0.00	
Tecarte Dam *[4]	112	50	67.8	0.00	
Tehama *[8]	104	58	84.0	0.02	
Templeton *[8]	107	52	70.7	0.00	
Trinidad L. H	......	......	......	0.43	
Truckee *[8]	86	42	60.8	0.00	
Tulare b	......	......	......	0.00	
Tulare c	112	48	81.2	0.00	
Turlock b †	107	40	73.6	0.00	
Ukiah †	95	35	63.8	T.	
Upper Lake	96	40	68.0	0.00	
Upper Mattole *[1]	88	40	59.4	0.50	
Vacaville a *[1]	103	54	75.1	0.00	
Ventura †	83	31	60.6	T.	
Volcano Springs *[8]	130	82	106.1	0.00	
Walnutcreek	104	47	72.4	0.00	
Wheatland †	105	46	74.6	T.	
Williams *[8]	103	60	79.9	0.00	
Willows b *[8]	102	60	81.1	0.00	
Wilmington *[5]	89	60	80.8	0.00	
Wire Bridge *[5]	103	53	77.7	0.00	
Yerba Buena L. H	......	......	......	0.00	
Yreka †	100	34	65.0	0.81	
Yuba City *[5]	99	69	81.8	T.	
Engineers Quarters ‡	......	......	......	0.00	
Morses House ‡	......	......	......	0.00	
Grass Valley ‡	......	......	......	0.00	
Deep Creek ‡	......	......	......	0.00	
Holcomb Creek ‡	......	......	......	0.00	
Squirrel Inn ‡	......	......	......	0.00	
Green Valley ‡	......	......	......	0.00	
Tunnel No. 2 ‡	......	......	......	0.00	
Colorado.					
Alma †	74	22	49.6	0.01	
Antlers [f]	97	44	71.7	0.00	
Boxelder	......	......	......	2.16	
Breckenridge †	82	25	53.7	0.30	0.1
Brush	98	39	68.4	......	
Byers *[1]	98	29	61.9	0.10	
Canyon †	97	43	70.2	0.23	
Capps	......	......	......	0.30	
Castlerock †	94	40	64.1	0.70	
Collbran	......	......	......	0.02	
Colorado Springs †	89	40	64.4	1.37	
Crook	98	42	70.4	2.29	
Deertrail *[5]	98	58	72.2	......	
Delta †	107	41	71.9	0.00	
Downing †	98	40	72.3	1.46	
Dumont *†[5]	89	37	63.7	0.58	
First View *[6]	104	......	73.0	1.60	
Fleming	......	......	......	3.99	
Fort Collins †	91	39	65.3	3.05	
Gleneyrie †	85	40	62.6	0.71	
Goldhill *[1]	88	37	59.7	1.60	
Grand Junction †	100	48	75.5	0.01	
Greeley †	93	41	68.0	0.46	
Gulch †	90	30	63.5	0.35	
Gunnison † [f]	89	28	61.6	0.00	
Holly	......	......	......	0.92	
Holyoke a	......	......	......	2.04	
Hugo *[5]	98	45	73.8	2.45	
Hugo (near)	91	38	65.8	0.70	
Husted †	92	36	64.4	0.94	
Kit Carson *[1]	104	60	79.7	......	
La Jara †	90	31	62.0	0.05	
Lake Moraine †	74	28	52.4	0.10	
Lamar	107	45	76.8	2.57	
Laporte	......	......	......	2.59	
Las Animas †	99	44	76.8	0.40	
Lay †	96	24	65.8	0.04	
Leadville (near) *†[1]	80	38	51.5	T.	
Leroy †	95	43	67.8	3.77	
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Longmont †	98	42	69.2	1.69	
Longs Peak	85	29	54.7	0.65	
Loveland	......	......	......	0.81	
Meeker †	97	25[f]	62.2[e]	0.16	
Millbrook †	88	30	59.6	0.19	
Minneapolis †	105	42	75.2	1.39	
Montrose	100	51	74.9	0.18	
Moraine †	81	29	56.6	0.49	
Ouray †	93	40	69.6	0.00	
Pagoda †	95	25	61.8	0.30	
Paonia †	......	......	......	T.	
Parachute †	102	41	71.4	0.70	
Pinkhamton *[1]	86	34	61.0	0.70	
Redcliff	......	......	......	0.60	
Rico †	85	32	55.8	0.59	
Riverbend *[5]	104	40	78.3	......	
Rockyford †	101	41	73.2	0.47	
Ruby †	......	......	......	0.10	
Saguache †	89	42	61.8	T.	
St. Cloud †	......	......	......	2.57	
San Luis †	96	26	62.2	0.26	
Seibert †	......	......	......	2.88	
Smoky Hill Mine †	87	35	58.0	1.69	
Stamford *[1]	82	30	54.8	1.60	
Sulphur Springs †	87	26	56.4	0.35	
Surface Creek †	96	35	67.4	0.16	
Thon †	100	41	67.5	0.75	
Vilas	......	......	......	1.10	
Wallet †	......	......	......	2.41	
Wray †	97	44	70.2	3.77	
Yuma	......	......	......	3.98	
Connecticut.					
Bridgeport	88	49	65.6	3.88	
Canton †	87	42	62.5	3.80	
Colchester	89	45	64.2	3.00	
Falls Village	......	......	......	2.53	
Greenfield Hill	......	......	......	4.69	
Hartford b	......	......	......	4.63	
Hartford c	88	48	65.9	......	
Lake Konomoc	......	......	......	1.99	
Middletown	89	44	65.9	4.36	
New London †	86	48	67.0	1.72	
North Franklin	......	......	......	2.29	
Norwalk	90	44	65.0	4.26	
Southington *[1]	86	47	64.7	5.30	
South Manchester	......	......	......	3.43	
Storrs	87	40	62.7	1.78	
Voluntown †	88[f]	39[f]	65.0[f]	2.92	
Wallingford †	......	......	......	4.30	
Waterbury	87	45	65.6	5.71	
West Cornwall	86	42	62.1	2.65	
West Simsbury	......	......	......	3.63	
Windsor	89	44	65.1	4.19	
Delaware.					
Dover †	90	52	70.0	7.68	
Milford	91	52	71.6	6.92	
Millsboro	91	50	71.3	4.03	
Newark	90	48	69.0	3.05	
Seaford †	88	51	70.0	5.81	
Wilmington †	97	42	72.6	4.41	
District of Columbia.					
Dist'ing Reservoir *[5]	90	56	72.3	1.61	
Receiving Reservoir *[5]	89	56	72.4	2.66	
West Washington	93	50	71.6	2.55	
Florida.					
Amelia †	93	60	78.6	6.97	
Archer †	97	61	80.1	14.46	
Bartow †	93	70	80.4	9.76	
Brooksville †	92	65	79.4	11.94	
Carrabelle †	95	67	81.0	9.00	
Clermont †	99	69	82.0	7.36	
Earnestville †	99	66[f]	81.8	17.92	
Emerson †	100	61	81.6	15.40	
Eustis †	97	68	80.6	7.79	
Federal Point †	95	61	78.8	9.36	
Fort Meade †	92	65	76.0	13.30	
Frostproof *†[1]	93	70	77.9	11.04	
Gainesville	99	66	81.2	11.14	
Grasmere †	97	65	81.8	7.06	
Kissimmee †	98	60	81.8	12.57	
Lake Butler †	98	62	80.7	9.90	
Lake City †	95	66	80.6	10.36	
Lemon City †	93	69	82.0	13.55	
Macclenny †	99	61	80.6	10.12	
Manatee †	97	64	79.7	9.65	
Merritts Island †	93	69	80.7	10.45	
Milton †	......	......	......	14.05	
Mullet Key †	94	71	82.6	10.02	
Myers †	92	71	82.6	20.90	
New Smyrna † c	92	65	78.0	8.44	
Oakhill *[1]	92	73	80.0	......	
Ocala *†[1]	94	72	78.4	12.98	
Orange City †	96	71	81.8	10.96	
Orangepark	97	53	75.4	5.72	
Orlando †	95	67	79.7	11.18	
Oxford *†[1]	95	72	79.7	8.50	
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Plant City †	98	67	80.6	16.44	
Quincy †	97	63	79.5	13.02	
St. Francis †	96	59	79.1	6.74	
St. Francis Barracks	92	65	78.0	6.38	
Tallahassee †	94	54	77.1	10.17	
Tarpon Springs †	89	66	79.0	8.97	
Georgia.					
Adairsville †	97	52	75.4	1.33	
Alapaha	102	57	80.3	3.10	
Albany †	104	59	82.1	1.85	
Allentown †	101	61	81.6	2.76	
Americus †	100	58	81.5	2.64	
Athens b	97	57	77.2	3.93	
Bainbridge	101	60	81.8	6.53	
Blakely *†[5]	98	63	77.2	1.91	
Brag †	101	55	76.1	6.58	
Brunswick †	93	62	78.8	1.85	
Camak	96	62	78.4	5.15	
Canton †	......	......	......	3.31	
Clayton †	92	46	71.6	4.63	
Columbus †	98	60	79.4	3.87	
Cordele	99	56	79.2	5.04	
Covington	97	54	76.6	3.71	
Dahlonega †	89	50	71.5	4.62	
Diamond †	91	47	71.2	4.75	
Eastman	101	60	80.3	3.44	
Elberton †	96	55	77.4	2.79	
Fleming †	98	58	79.2	7.21	
Fort Gaines	99	60	80.4	3.94	
Gainesville	98	54	76.2	2.08	
Gillsville †	98	53	76.0	2.82	
Griffin †	97	58	78.9	3.08	
Hephzibah *†[5]	92	60	77.0	1.40	
Lagrange †	98	57	78.2	1.66	
Leverett †	103	53	78.0	1.80	
Lumpkin †	98	62	77.9	3.27	
Macon †	98	52	78.4	3.29	
Marshallville †	96	60	80.4	2.04	
Milledgeville †	97	59	77.3	3.72	
Millen	100	55	79.5	3.49	
Monticello *†[1]	98	65	79.8	0.90	
Morgan †	98[d]	58[d]	78.8[d]	5.96	
Newnan †	96	57	77.4	3.72	
Point Peter *[1]	94	58	75.8	1.45	
Poulan †	102	56	79.0	2.64	
Quitman †	96	59	79.2	7.81	
Ramsey †	95	50	74.2	1.27	
Rome †	95	54	75.8	1.85	
Talbotton †	94	57	76.6	4.01	
Thomasville †	98	60	79.6	4.96	
Toccoa †	96	53	74.0	3.40	
Union Point †	93	56	76.0	5.04	
Washington †	96	56	76.7	4.75	
Waycross †	99	59	80.0	5.24	
Waynesboro †	99	58	77.6	3.50	
West Point	96	58	78.7	1.88	
Idaho.					
American Falls †	96	34	64.7	0.83	
Atlanta †	......	......	......	1.07	
Birch Creek	91	34	61.8	1.02	
Blackfoot †	97	31	63.1	0.27	
Boise Barracks †	100	40	67.8	1.36	
Burnside †	90	35	62.8	1.49	
Chesterfield †	96	26	60.6	0.43	
Cœur d'Alene	95	35	60.8	......	
Corral *†[1]	91	39	60.4	0.43	
Dairy †	92	33	62.8	1.15	
Downey †	92	27	61.0	0.05	
Fort Lemhi †	93	31	65.4	0.99	
Fort Sherman †	98	35	61.6	0.87	
Fraser †	98	30	59.2	2.20	
Gimlet †	88	30	59.8	......	
Grangeville	89	37	59.0	3.24	
Idaho City †	92	31	60.6	1.70	
Kootenai †	89	36	62.4	......	
Lake †	78	28	57.1	0.50	
Lewiston a †	103	39[c]	67.4[c]	1.34	
Lewiston b †	......	......	......	1.00	
Lost River †	......	......	......	0.60	
Martin †	81[1]	28[1]	54.2[1]	0.20[1]	
Minidoka †	95	30	67.2	1.20	
Moscow †	92	34	60.2	2.21	
Murray †	99	25	58.6	1.37	
Nampa	100	38	66.2	1.04	
Oakley †	99	32	67.4	0.50	
Paris †	88	27	59.7	0.07	
Payette †	103	27	69.0	1.58	
Pollock †	103	39	64.4	1.22	
Roseberry †[4]	80	28	54.3	1.09	
Salubria †	98	37	66.2	1.58	
Shoup	95	43	66.3	1.02	
Soldier †	87	31	59.5	0.51	
Swan Valley †	90	25	60.6	0.71	
Warren †	88	30	54.2	1.40	
Illinois.					
Albion †	98	50	73.0	6.13	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. (Fahrenheit.) Minimum.	Temperature. (Fahrenheit.) Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Alexander †	95	50	73.6	4.63	
Ashton *†1	92	52	71.1	3.55	
Atwood *a* *†2	92	48	68.3	5.72	
Atwood *b*	......	......	......	5.08	
Aurora *a*	94	42	71.1	2.06	
Aurora *b* †	92	42	69.0	2.62	
Beardstown †	......	......	......	3.66	
Bloomington †	95	44	72.2	3.90	
Bushnell †	96	50	73.8	2.58	
Cambridge	90	46	70.2	2.80	
Carlinville †	91	54	71.6	6.60	
Carlyle				3.36	
Carrollton	88	53	70.4	2.92	
Catlin †	98			3.18	
Cazenovia *†1	94	54	74.3	3.09	
Charleston	92	52	72.6	8.12	
Chemung *1	93	40	69.3	3.18	
Chester †	......	......	......	7.08	
Cisne *†1	98	56	72.8	8.29	
Clearcreek †	96	42	70.2	2.81	
Cobden †	91	52	72.7	5.50	
Decatur †	92	55	72.8	4.00	
Dixon †	91	46	70.0	3.18	
Duquoin *1	94	60	75.5	3.45	
Dwight †	93	39	69.6	3.13	
East Peoria †	96	45	71.8	3.47	
Effingham	94[a]	52[a]	77.0[a]	4.60	
Evanston *10	90	52	67.6	......	
Fort Sheridan †	......	39	......	1.95	
Friendgrove †				8.18	
Galva †	90	44	69.9	3.10	
Glenwood *†1	88	50	63.9	3.41	
Grafton †				7.08	
Greenville †	95	55	74.2	5.03	
Griggsville †	92	50	72.0	3.29	
Halliday *5	90[d]	59[d]	77.4[d]	3.51	
Havana †	91	54	73.4	3.25	
Herrins Prairie *1	90	58	74.2	3.95	
Hillsboro †	91	54	72.0	3.11	
Iron †	88	54	74.0	5.82	
Joliet †	96	43	71.6	3.89	
Jordans Grove †	91	55	73.8	2.84	
Kankakee *a* †	87	47	67.7	5.64	
Kankakee *b* *3 4	90	55	71.8		
Kishwaukee	90	45	68.2	2.01	
Knoxville *a* *5	92	49	72.0	3.65	
Laharpe *1	94	52	72.2	5.16	
Lanark *†1	90	42	66.5	2.92	
Lexington †	93	45	69.9	4.58	
Loami †				3.57	
Louisville †	89	54	71.6	5.20	
McLeansboro †	91	55	72.9	4.86	
Martinsville †	91	50	71.8	3.23	
Martinton †	98	44	71.0	4.42	
Mascoutah *5	100	54	77.0	5.20	
Mattoon *1	92	58	72.8	5.68	
Minonk *†1	88	54	70.3	3.87	
Monmouth †	91	44	70.0	3.56	
Morrisonville †	91	49	71.6	3.65	
Mount Carmel †				4.69	
Mount Pulaski	92	50	72.2	4.74	
Mount Vernon	92	50	73.7	3.37	
New Burnside †	95	53	75.6	5.90	
Olney *a* *1	92	56	74.8	3.82	
Oregon †	92	46	69.0	3.55	
Oswego *1	94	46	68.5	1.75	
Ottawa †	94	44	70.4	2.22	
Palestine †	98	53	73.7	7.33	
Paris †	97	48	74.0	5.45	
Peoria *a* †				2.59	
Peoria *b* †	97	52	74.3	2.23	
Philo †	95	49	71.6	3.45	
Plumhill *†2	95	54	73.7	4.20	
Rantoul *†1	95	46	71.0	4.08	
Reynolds	89	44	69.0	2.65	
Riley †	90	43	67.6	3.02	
Robinson *†3	93	57	71.2	4.33	
Rockford †	94	48	69.9	2.34	
Rose Hill *†1	94	58	75.1		
Roundgrove †	98	50	71.5	3.30	
St. Charles *†1	90	50	68.9	2.52	
St. John *†1	92	60	74.2	4.40	
Scales Mound †	92	43	68.8	2.04	
Streator †	92	50	71.8	3.27	
Sycamore *†1	88	46	67.5	1.59	
Tiskilwa *†2	94	51	70.0	2.81	
Tuscola †	94	45	72.3	3.46	
Walnut †	91	45	70.2	3.81	
Warsaw †				2.39	
Wheaton *2	......	50	68.0	2.83	
Winnebago †	90	43	68.0	2.94	
Zion †	92	44	67.8	2.18	
Indiana.					
Anderson †	91	48	70.2	3.74	
Angola *1	100	51	70.5	3.58	
Bedford	......	......	......	3.80	
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bloomington †	92	53	72.5	3.52	
Bluffton †	96	44	70.5	4.66	
Butlerville †	95	47	72.2	5.02	
Cambridge City †	89	46	69.2	3.49	
Columbia City *1	93	46	69.3	2.15	
Columbus †	94	45	71.2	3.51	
Connersville †	90	48	70.4	4.05	
Delphi †	91	44	67.3	2.99	
Edwardsville *†1	90	57	73.4	5.64	
Evansville †	93	55	74.7	6.62	
Farmland †	88	47	68.7	4.54	
Greencastle †	88	52	70.8	5.74	
Greensburg	......	......	......	2.94	
Hammond †	91	40	70.2	2.82	
Huntington	93	42	69.4	3.95	
Jasper †	91	53	72.6	4.81	
Jeffersonville	92	54	73.4	4.88	
Knightstown †	92	48	71.2	4.58	
Kokomo †	97	48	72.3	2.08	
Laconia	94	54	74.8	4.05	
Lafayette †	93	46	70.5	4.13	
Logansport *b* †	89	49	69.6	3.74	
Madison †	91	52	73.2	6.81	
Marengo †	93	50	72.6	5.31	
Marion †	94	47	70.4	3.77	
Mauzy †	92	46	70.7	4.26	
Mount Vernon †	93	52	74.3	3.73	
Northfield †	92	47	70.4	4.04	
Princeton *†1	95	54	72.6	5.20	
Rockville †	91	50	70.5	5.59	
Rushville †	......	......	......	5.79	
Scottsburg †	92	53	72.9	7.59	
Seymour †	94	52	72.7	5.78	
South Bend †	93	42	68.7	3.81	
Sunman	88	48	69.6	6.02	
Syracuse †	......	......	......	2.04	
Terre Haute †	91	55	73.6	5.19	
Tipton	98	......	......	3.53	
Valparaiso †	90	47	69.6	4.34	
Vevay	95	55	75.5	4.60	
Vincennes †	98	50	73.7	5.65	
Washington †	91	54	71.9	6.38	
Worthington †	91	54	71.6	6.00	
Indian Territory.					
Eufaula †	......	......	......	1.96	
Healdton †	105	38	81.9	1.60	
Kemp †	107	52	83.8	0.67	
Lehigh †	104	48	79.9	2.17	
Purcell †	108	61	80.6	2.27	
South McAlester	104	52	78.6	2.25	
Tahlequah † b	96	50	80.8	2.80	
Tulsa †	......	......	......	4.10	
Iowa.					
Adair	......	......	......	2.63	
Afton	96	47	70.4	3.00	
Algona *1	92	49	70.1	3.75	
Alta *a* †	94	44	68.9	5.40	
Amana †	93	43	70.2	2.05	
Ames *b*	94	46	70.0	2.06	
Atlantic †	97	41	69.6	7.89	
Atlantic (near)	93	45	70.5	2.61	
Audubon	91	40	67.3	2.60	
Belknap	90	42	70.7	1.19	
Belle Plaine	94	40	69.4	2.03	
Bonaparte †	95	48	71.2	2.30	
Carroll	94	43	69.2	2.32	
Cedarfalls †	93	44	69.2	3.23	
Cedar Rapids †	99	46	73.2	1.91	
Centerville	92	49	70.7	2.36	
Chariton	90	48	69.8	2.42	
Charles City †	89	45	69.2	6.23	
Clarinda †	90	46	68.4	2.12	
Clinton	95	45	71.3	3.10	
College Springs	93	47	70.2	2.00	
Corning †	95	47	70.4	3.07	
Council Bluffs	......	......	......	1.72	
Cresco †	85	45	66.3	4.27	
Decorah †	87	41	68.4	5.71	
Delaware *3	88	47	68.6	3.00	
Denison †	93	45	71.0	2.08	
Dows	89	45	68.2	5.48	
Eldora	94	46	69.4	3.13	
Elkader †	93	41	69.2	2.77	
Estherville	98	42	69.8	1.98	
Fairfield †	95	46	69.6	1.08	
Fonda	96	50	72.9	3.08	
Forest City	90	45	68.1	5.97	
Fort Madison *†1	90	56	73.2	2.48	
Galva †	96	44	68.2	3.42	
Gardengrove	93	43	69.3	2.07	
Glenwood †	98	48	73.6	2.21	
Grand Meadow *1	90	46	66.9	5.11	
Greenfield †	97	46	71.0	3.52	
Grundy Center	91	44	68.0	3.38	
Guthrie Center †	95	42	69.4	1.50	
Hampton	90	45	66.4	3.60	
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hawkeye	......	......	......	5.14	
Hopeville †	91	47	69.3	2.22	
Humboldt †	98	44	71.2	2.39	
Independence †	87	44	66.8	3.25	
Indianola †	92	47	70.0	2.85	
Iowa City *a* †	92	43	71.8	1.86	
Iowa City *b*	88	44	68.5	......	
Iowa Falls †	91	41	66.6	5.97	
Keosauqua †	92	52	72.2	1.93	
Knoxville	97	47	71.0	3.04	
Lansing 1	91	46	70.5	4.97	
Larrabee †	91	45	67.8	3.36	
Leclaire †	......	......	......	2.27	
Lemars	92	46	69.8	2.67	
Lenox *1	92	50	70.7	2.59	
Logan †	96	46	70.1	7.85	
Madrid	98	46	70.6	3.55	
Malvern *1	100	44	71.2	3.39	
Maple Valley	......	......	......	3.18	
Maquoketa †	92	45	69.2	2.53	
Marshall †	94	46	68.8	1.55	
Mason City †	90	......	......	7.64	
Maxon *1	92	52	72.6	1.98	
Mechanicsville	91	45	69.4	2.09	
Millman				3.37	
Monticello *†1	88	46	66.8	1.91	
Mooar	96	47	62.9	1.44	
Mountayr †	97	44	70.8	2.09	
Mount Pleasant *1	90	56	73.2	1.97	
Mount Vernon *1	94	53	71.1	1.82	
Newton †	93	46	70.2	4.93	
North McGregor †				4.12	
Northwood	91	41	67.2	5.44	
Ogden	93	45	70.0	1.70	
Osage *†3	......	49	66.6	4.70	
Osceola	98	45	70.5	3.26	
Oskaloosa †	94	44	69.3	1.34	
Ottumwa	93	49	71.4	1.01	
Ovid †	90	47	69.8	2.53	
Panama †	92	46	67.9	4.81	
Plover				2.03	
Portsmouth	97	44	71.2	3.03	
Primghar	93	45	69.2	2.50	
Reinbeck				1.22	
Rock Rapids	94	36	64.8	5.79	
Sac City †	98	46	70.8	4.95	
Seymour †	92	48	71.0	2.57	
Sibley	92	43	66.6	3.92	
Sidney	92	51	70.2	3.53	
Spencer	95	43	68.3	3.48	
Spirit Lake †	97	44	67.6	2.51	
Stuart	92	46	70.2	3.83	
Toledo	91	43	69.0	1.28	
Villisca †	91	43	69.6	3.01	
Vinton *1	89[a]	50	69.9	0.81	
Washington †	91	45	69.9	2.23	
Waterloo	94	44	70.4	2.60	
Waukee	94	45	70.6	3.20	
Waverly	88	48	68.8	3.94	
Webster City	93	47	70.4	1.84	
Westbend *†1	93	47	68.4	2.46	
Wilton Junction †	94	42	69.8	2.76	
Winterset †	94	44	68.9	5.73	
Kansas.					
Abilene †	98	47	73.4	9.04	
Achilles *3	107	49	71.0[a]	4.29	
Altoona *†3	95	48	71.9	3.05	
Assaria *5	97	46	72.6	8.38	
Atchison †	93	47	71.6	1.84	
Augusta	97	45	73.4	7.99	
Baker	95	46	70.8	1.91	
Beloit †	102	45	74.0	2.94	
Blaine	99	47	73.5	1.30	
Burlington †	98	46	73.4	3.91	
Campbell	99	45	72.0	2.65	
Chanute †	92	50	73.6	4.71	
Colby †	103	39	71.4	5.39	
Coldwater †	108	45	78.0	3.12	
Collyer *1	98	48	73.5	4.50	
Columbus †	95	49	74.0	7.84	
Coolidge †	105	43	75.9	1.05	
Cunningham †	105	41	75.4	6.11	
Delphos *1	101	52	74.5	2.94	
Downs				3.10	
Dresden *†1	102	48	71.0	4.42	
Effingham 4	98	46	73.2		
Eldorado †	98	46	73.4	5.70	
Elgin *1	96	52	73.5	5.21	
Ellinwood	102	43	74.4	4.11	
Emporia †	94	48	74.0	3.20	
Englewood †	108	35	76.5	2.81	
Eureka †	......	......	......	4.01	
Eureka Ranch †	105	43	74.0	4.42	
Fort Riley †	92	36	71.0	4.72	
Fort Scott	91	49	73.2	3.42	
Frankfort	99	47	76.5	2.15	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Kansas—Cont'd.					
Garfield	......	......	......	4.89	
Gibson *[5]	98	42	72.4	6.06	
Girard *[1]	93	56	74.6	3.09	
Gove *†[1]	101	52	74.4	4.31	
Grainfield *[6]	100	52	72.7	6.41	
Grenola *[1]	96	48	74.0	5.30	
Halstead	96	46	71.0	6.31	
Horton †	96	47	72.6	1.62	
Hutchinson †	98	47	74.8	6.51	
Independence †	100	48	75.8	3.46	
Jaqua	105	42	74.6	4.06	
Lawrence	92	46	71.9	3.92	
Lebo †	95	43	72.8	3.89	
Lyons	105	45	76.6	8.92	
Macksville †	110	39	77.2	4.18	
McPherson †	98	45	72.8	8.38	
Manhattan *b*	98	46	74.4	2.63	
Manhattan *c*	105	41	76.5	3.69	
Marion †	100	43	76.4	7.47	
Meade †	114	50	78.2	2.19	
Medicine Lodge †	105	46	77.6	6.07	
Minneapolis †	100	42	73.7	3.39	
Morantown †	93	46	72.6	2.80	
Morton †	111	47	78.4	1.64	
Mounthope *[1]	99	55	75.8	5.17	
Ness City †	109	43	76.8	3.94	
New England Ranch †	100[1]	44[1]	70.4[1]	4.50	
Norton †	101	42	70.6	3.74	
Norwich	......	......	......	7.25	
Oberlin †	......	......	......	5.36	
Olathe †	94	45	72.6	2.66	
Osage City †	98	50	75.2	2.61	
Oswego †	96	49	76.2	5.86	
Ottawa †	92	45	72.2	2.44	
Paola †	93	46	73.3	1.50	
Phillipsburg †	104	46	73.8	5.02	
Pleasant Dale †	104	41	73.6	4.87	
Pratt †	102	46	76.4	4.71	
Rome *†[1]	100	45	74.4	6.06	
Russell †	105	43	75.7	7.32	
Salina †	100	44	74.2	9.97	
Scott City †	104	41	74.0	4.29	
Sedan †	97	48	75.4	5.84	
Sharon Springs *[1]	104	50	76.4	2.25	
Tribune †	......	......	......	2.15	
Ulysses †	105[d]	45[d]	77.5[d]	0.86	
Wakefield *[1]	103	54	75.0	5.56	
Wallace *[4]	100	48	72.0	1.10	
Wamego *[1]	94	52	73.7	2.54	
Wellington *[1]	96	47	77.0	8.72	
Winfield *[5]	106	42	76.0	6.15	
Winona *[5]	102	50	72.8	2.58	
Yates Center †	94	45	73.1	2.21	
Kentucky.					
Alpha †	91	53	74.0	6.01	
Anchorage †	89	55	71.8	5.56	
Ashland *[1]	98	58	74.7	......	
Blandville †	88	53	72.9	11.22	
Bowling Green *a* *[1]	92	48	70.1	4.09	
Bowling Green *b* †	94	55	75.2	3.94	
Burnside †	......	......	......	4.73	
Caddo †	90	51	72.0	7.80	
Canton *†[1]	90	59	72.6	3.23	
Carrollton †	94	56	75.6	5.30	
Catlettsburg †	......	......	......	5.97	
Earlington	90	56	73.2	4.74	
Edmonton †	88	51	72.0	3.48	
Eubank †	95	46	72.0	4.16	
Falmouth †	......	......	......	6.82	
Fords Ferry †	95	52	74.9	2.02	
Frankfort †	91	49	72.8	4.44	
Franklin *†[1]	92	60	74.5	3.52	
Georgetown	94	54	73.4	......	
Greendale *[1]	94	58	73.3	5.23	
Greensburg †	88	53	73.3	8.47	
Henderson †	93	57	74.9	4.40	
Hopkinsville	89	54	73.0	4.31	
Leitchfield †	92	48	72.6	2.87	
Louisa † *a*	91	49	72.6	5.07	
Marrowbone †	93	48	73.4	3.46	
Maysville *[1]	90	60	75.8	......	
Middlesboro †	91	49	72.2	4.81	
Mount Sterling †	91	48	71.2	4.78	
Owenton †	92	51	73.2	4.82	
Paducah *a* †	......	......	......	4.72	
Paducah *b* †	94	58	76.6	4.22	
Pleasure Ridge Park †	91	51	72.8	4.66	
Princeton †	94	55	74.4	5.02	
Pryorsburg [j]	98	54	77.5	3.88	
Russellville †	90	53	73.9	2.82	
St. John †	91	51	72.2	3.10	
Sandyhook †	......	......	......	5.00	
Shelby City *[1]	90	54	72.5	3.63	
Shelbyville †	95	51	73.7	4.26	
Southfork †[2]	......	......	71.1	4.31	
Springfield †	93	49	72.0	2.40	
Kentucky—Cont'd.					
Vanceburg †	92	48	71.8	3.15	
Williamsburg †	90	50	72.8	6.11	
Louisiana.					
Abbeville	94	63	79.2	6.35	
Alexandria †	99	55	80.8	2.02	
Amite †	98	57	79.3	8.20	
Baton Rouge †	96	62	80.2	6.52	
Calhoun †	100	53	79.5	0.78	
Cameron †	97	65	81.8	4.35	
Cheneyville †	100	53	79.6	2.36	
Clinton †	97	57	84.7	5.90	
Covington †	98	57	79.2	7.04	
Davis	101[1]	50[b]	79.2[b]	1.31	
Donaldsonville †	93	61	79.6	9.87	
Elm Hall	96	60	77.9	......	
Emilie †	95	62	79.6	12.18	
Farmerville	99[d]	52[d]	79.6[d]	0.66	
Grand Coteau	94	62	79.3	5.76	
Hammond †	96	57	79.4	8.93	
Houma †	100	57	80.4	5.25	
Jeanerette †	97	59	80.8	7.51	
Lafayette †	97	59	80.2	6.33	
Lake Charles †	96	63	82.0	5.84	
Lake Providence	97	62	83.2	0.31	
Liberty Hill	104	52	77.2	2.35	
Mansfield †	99	51	79.6	3.70	
Maurepas	100	57[1]	79.2[d]	7.98	
Melville †	97	58	80.1	4.93	
Minden	100	54	80.3	0.42	
Monroe †	98	59	81.8	1.34	
New Iberia	95	64	79.5	9.45	
Oakridge †	......	51	......	4.24	
Oberlin	100	50	84.2	3.50	
Opelousas †	96[c]	54	79.8	7.61	
Oxford †	98	50	78.2	1.24	
Paincourtville †	96	58	80.1	10.94	
Plain Dealing †	95	54	79.8	2.44	
Rayne †	98	60	79.8	7.97	
Roberline †	102	50	80.2	0.98	
Ruston †	98	......	......	0.78	
Schriever †	98	58	80.1	10.64	
Southern University †	92	64	77.6	8.60	
Sugar Ex. Station †	97	65	80.8	11.04	
Thibodeaux	......	......	......	7.16	
Trinity	99	......	......	2.48	
Venice †	96	56	77.0	5.76	
Wallace	96	64	80.3	12.84	
West End	......	......	......	9.70	
White Sulphur Springs	......	......	......	2.40	
Maine.					
Bar Harbor	87	35	57.6	2.39	
Belfast *[6]	82	49	62.4	2.21	
Cornish *[1]	86	47	63.2	2.68	
Fairfield	87	34	60.5	1.91	
Farmington †	94	39	65.6	2.49	
Flagstaff †	87	33	59.2	2.40	
Fort Fairfield	90	32	62.2	2.40	
Gardiner	91	43	64.6	1.94	
Kineo †	80	41	60.2	2.47	
Lewiston	88	46	64.6	2.58	
Mayfield	86	37	60.8	3.13	
North Bridgton	88	41	62.5	2.09	
Winslow	90	41	62.2	2.33	
Maryland.					
Annapolis	91	63	76.1	3.11	
Bachmans Valley	94	41	68.0	5.09	
Boettcherville *[1]	88	48	66.8	5.80	
Cambridge †[e]	96	54	71.5	......	
Charlotte Hall †	89	49	70.8	4.38	
Cherryfields †[2]	......	......	71.7	3.39	
Chestertown †	88	50	71.8	3.73	
Collegepark	92	45	68.9	2.00	
Cumberland *a* †	88	50	68.7	4.22	
Cumberland *b*	93	53	73.5	4.67	
Darlington †	89	43	69.5	3.40	
Deerpark	85	32	63.0	4.23	
Denton	90	51	71.0	5.33	
Easton †	88	50	69.6	3.76	
Ellicott City	86	54	70.2	2.90	
Fallston *[1]	88	57	69.6	4.07	
Flintstone	91	39	68.2	4.36	
Frederick *a*	93	47	70.2	3.83	
Grantsville	86	37	63.4	5.78	
Greatfalls *[5]	90	58	72.2	3.44	
Greenspring Furnace	93	44	69.8	4.40	
Hagerstown †	98	49	71.1	5.28	
Jewell †	88	52	71.2	4.75	
Johns Hopkins Hospital	93	52	70.9	......	
Laurel	95	49	70.4	3.15	
Mardela Springs †	89	51	71.8	1.90	
Mount St. Mary's Col.	90	50	69.4	4.00	
New Market	92	46	72.9	3.57	
Pocomoke City	92	53	74.2	1.72	
Princess Anne	89	46	70.0	3.03	
Sharpsburg	91	45	69.2	5.79	
Solomons †	92	55	73.8	3.97	
Maryland—Cont'd.					
Sunnyside	85	33	64.0	5.88	
Van Bibber	93	52	70.0	3.10	
Western Port	100	42	71.5	4.77	
Woodstock	92	46	69.2	2.50	
Massachusetts.					
Adams	86	41	62.8	......	
Amherst	90	41	63.8	2.46	
Amherst Ex. Station *b*	90	39	64.0	2.57	
Andover *[3]	......	48	62.7	2.16	
Ashland	......	......	......	3.30	
Attleboro	......	......	......	3.78	
Bedford	88	44	63.4	2.44	
Beverly Farms	86	45	61.7	2.67	
Bluehill (summit)	87	45	63.2	3.41	
Bluehill (valley)	89	39	63.4	3.51	
Boston *a*	......	......	......	2.52	
Brockton *a*	91	44	64.7	3.53	
Brockton *b*	......	......	......	3.49	
Brockton *c*	......	......	......	3.60	
Cambridge *a*	91	43	65.4	2.15	
Chestnut Hill	92	44	65.8	2.98	
Clinton	......	......	......	1.92	
Cohasset	......	......	......	4.44	
Concord †	90	40	63.9	2.25	
Dudley [1]	88[e]	45	63.9	2.80	
East Templeton *[1]	88	46	63.7	1.01	
Fallriver	88	50	66.4	4.23	
Fitchburg *a* *[1]	87	47	64.2	2.25	
Fitchburg *b*	89	45	64.3	1.92	
Framingham	92	42	65.9	3.14	
Groton	89	40	62.8	2.29	
Hingham	......	......	......	4.27	
Hobbs Brook	......	......	......	2.21	
Hyannis *†[1]	85	50	66.7	3.23	
Lake Cochituate	91	38	64.7	3.04	
Lawrence	96	46	66.9	1.49	
Leeds	92	40	64.0	2.94	
Leicester Hill	87	43	62.6	2.88	
Leominster	......	......	......	2.49	
Long Plain *[6]	85	40	62.6	5.83	
Lowell *a*	90	44	65.2	2.68	
Lowell *c*	94	45	66.0	......	
Ludlow Center	85	35	60.7	2.45	
Mansfield *[1]	89	44	63.7	3.71	
Middleboro	87	38	62.7	3.62	
Milton	87	43	62.4	3.68	
Monroe	85	37	59.2	1.98	
Mount Nonotuck	......	......	......	3.06	
Mount Wachusett	......	......	......	2.40	
Mystic Lake	......	......	......	2.51	
Mystic Station	......	......	......	2.32	
Natick *[1]	87	49	65.3	2.98	
New Bedford *a*	85	46	63.3	4.98	
New Bedford *b*	86	44	63.8	4.82	
North Billerica	90	43	64.6	2.05	
Pittsfield	85	40	63.0	3.40	
Plymouth *[1]	88	52	65.5	3.59	
Princeton	......	......	......	2.56	
Provincetown	85	48	63.6	......	
Quinapoxet	......	......	......	2.64	
Roberts Dam	......	......	......	2.68	
South Clinton	......	......	......	2.53	
Springfield Armory	92	40	64.2	2.87	
Sterling	......	......	......	2.75	
Taunton *b*	89	43	64.7	3.63	
Taunton *c*	86	38	62.6	4.21	
Wakefield †	91	44	65.7	2.16	
Waltham	......	......	......	2.65	
Webster	......	......	......	3.30	
Westboro †	92	40	66.0	3.34	
Williamstown *[1]	83	51	63.8	2.55	
Winchester	......	......	......	2.18	
Worcester *b*	87	48	64.6	2.75	
Michigan.					
Adrian	95	42	69.0	4.94	
Allegan	91	41	68.6	2.50	
Alma	93	42	67.6	3.19	
Ann Arbor	88	45	68.2	3.99	
Arbela	92	39	68.1	3.98	
Ball Mountain	87	43	67.4	2.86	
Baraga	93	31	62.8	1.14	
Battlecreek	94	43	69.6	7.16	
Bay City *a*	89[e]	40	65.8	1.49	
Bay City *b*	94	42	67.2	1.26	
Benton Harbor	92	41	68.6	1.52	
Benzonia	......	......	......	2.12	
Berlin *[1]	95	41	67.5	2.82	
Berrien Springs	91	41	67.7	2.20	
Big Rapids	89	39	66.0	1.69	
Birmingham	90	44	69.6	4.33	
Bois Blanc *[10]	84	44	63.2	......	
Boon	88	33	64.2	1.83	
Bronson	97	42	69.5	2.27	
Calumet	83	40	62.2	1.77	
Charlevoix	86	42	63.7	2.75	
Cheboygan	86	36	62.2	2.76	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	Ins.	Ins.
Clinton	94	41	68.8	4.53	
Fitchburg	92	36	68.6	5.05	
Flint	91	35	66.4	2.25	
Gaylord	86	33	63.2	2.87	
Gladwin [3]	94	51*	67.1	1.60	
Grand Rapids *b*	90	42	69.9	1.85	
Grape	90	45	68.7	3.51	
Grayling	94	32	65.0	2.20	
Hanover	90	39	67.0	6.26	
Harrison	91	35	65.5	2.40	
Harrisville	88	38	61.3	4.39	
Hart	90	35	67.6	1.85	
Hastings	89	41	68.2	2.76	
Hayes	90	38	65.6	0.78	
Hesperia	94	39	67.2	1.26	
Highland Station	......	......	......	1.93	
Holland *[10]	88	48	68.0	......	
Howell	91	38	67.0	3.73	
Iron River	86[d]	27[d]	61.6[d]	1.30	
Ivan	94	36	66.4	1.12	
Jeddo	87	36	64.2	2.48	
Lake City	90	35	63.8	......	
Lansing	89	43	67.1	3.39	
Lathrop	90	31	61.2	3.01	
Lewiston	89	41	66.2	2.89	
Ludington *[10]	86	38	70.4	......	
Mackinaw City	84	39	61.4	4.46	
Madison	94	44	69.2	3.98	
Mancelona	86	33	64.9	1.69	
Manistique	83	39	60.7	4.68	
Mayville	89	42	66.7	3.16	
Middle Island *[10]	86	48	64.8	......	
Midland	95	39	67.6	1.47	
Mottville	95	42	69.2	2.47	
Mount Pleasant *a*	92	38	66.3	3.70	
Mount Pleasant *b*	95[d]	40[d]	67.2[d]	......	
Muskegon *	84	45	67.9	0.64	
North Manitou Island *[10]	83	40	63.0	......	
North Marshall	88	42	66.7	6.92	
Northport	84	39	63.6	1.60	
Old Mission	89	38	64.7	2.19	
Olivet	88	42	68.3	6.58	
Ovid	96	40	67.9	3.07	
Owosso	90	38	67.0	2.04	
Parkville	......	......	......	2.70	
Petoskey	83[e]	42[e]	62.4[e]	2.37	
Plymouth	91	40	66.9	5.70	
Point au Barques *[10]	86	44	65.1	......	
Pontiac	88	40	66.2	3.14	
Port Austin	87	35	62.4	3.08	
Powers	90	36	63.7	5.40	
Reed City	93	33	65.9	1.45	
Rockland	88	41	64.6	1.34	
Rogers City	84	38	59.6	3.10	
Romeo	90	42	67.0	2.11	
Saginaw	99	38	72.4	2.41	
St. Ignace	79	39	60.8	3.69	
St. Johns	91	39	67.8	3.06	
Sandbeach *a*	88	38	61.9	3.72	
Saranac	91	39	67.8	1.38	
Somerset	89[e]	46[e]	68.4[e]	3.28	
South Haven	88	40	67.0	1.10	
Stanton	93	39	67.8	2.01	
Thornville	91	46	69.7	4.02	
Three Rivers	100[d]	46[d]	73.2[d]	......	
Traverse City	89	43	65.9	0.52	
Two Heart River *[10]	90	36	67.0	......	
Valley Center	96	38	69.0	3.01	
Vandalia	96	46	68.8	2.08	
Ypsilanti	88	38	65.0	5.19	
Minnesota.					
Ada †	95	43	68.2	1.52	
Albert Lea † [6]	86*	44	67.5	6.15	
Alexandria †	......	......	......	2.77	
Beardsley †	92	37[f]	66.4[f]	3.56	
Belleplaine *[1]	94	54	70.0	3.90	
Bermidji †	92	40	70.3	2.97	
Bird Island	88	44	66.4	6.51	
Blooming Prairie †	88	42	66.9	2.72	
Bonniwell †	92	41	67.4	4.88	
Breese †	90	41	64.8	3.52	
Caledonia †	87	41	67.3	5.34	
Cambridge †	91	39	65.9	4.31	
Camden †	93	41	66.2	5.65	
Clear Lake	90	39	65.9	5.93	
Collegeville	95	45	68.9	4.74	
Crookston †	90	48	66.8	2.95	
Dawson *[1]	100	45	69.1	3.29	
Faribault	89	42	67.8	3.66	
Farmington †	90	41	65.6	3.23	
Fergus Falls †	91	47	66.6	6.86	
Glencoe †	87	44	69.8	2.59	
Glenwood †	98	43	68.4	4.31	
Grand Meadow †	92	44	67.8	5.79	
Grand Portage †	63	35	50.2	1.99	
Granite Falls †	92	42	66.6	4.23	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	Ins.	Ins.
Lakeside †	88	40	67.5	5.80	
Lake Winnibigoshish [1]	84*	48	64.0	3.57	
Lambert †	89	40	66.2	3.60	
Lawrence †	90	39	65.8	3.25	
Leech Lake [1]	88*	38	63.8	3.22	
Lesueur *[1]	92	48	68.2	6.12	
Long Prairie †	91	37	65.8	4.18	
Luverne †	90	44	66.2	9.76	
Mapleplain	90	43	67.4	3.93	
Mazeppa [1]	98*	38	73.1	2.60	
Milan †	91	43	66.2	3.43	
Minneapolis *a*	90	44	68.0	3.76	
Minneapolis *b* [6]	90*	39	68.0	2.85	
Minnesota City *†[1]	88	40	67.6	7.09	
Montevideo †	91	45	66.0	3.89	
Morris †	94	46	67.6	3.94	
Mount Iron †	90	33	60.2	2.51	
New London	88	42	65.8	3.46	
New Richland *[1]	88[d]	50[d]	67.7[d]		
New Ulm †	92	45	68.4	4.17	
Park Rapids †	92	40	63.4	4.63	
Pine River *[1]	86	44	65.5	3.90	
Pleasant Mounds †	87	44	66.2	2.05	
Pokegama Falls [1]	91*	39	63.2	3.13	
Redwing †	......	......	......	2.98	
Reeds †	......	......	......	4.61	
Rolling Green †	86	45	66.6	3.65	
Roseau †	89[e]	42[e]	64.5[e]	3.25	
St. Charles †	86	42	67.2	6.04	
St. Cloud	85	45	65.3	6.00	
St. Olaf	91	44	66.3	5.02	
Sandy Lake Dam [1]	88*	40	63.9	2.65	
Sauk Center	92	42	65.8	4.18	
Shakopee [6]	90*	45	69.8	3.00	
Tower †	90	30	59.6	2.95	
Two Harbors †	89	37	59.0	2.44	
Wabasha *[1]	91	50	68.3	3.81	
Willmar †	91	41	68.0	3.83	
Winona	87	46	68.4	5.35	
Worthington	88	44	66.6	3.75	
Zumbrota [1]	88*	35	66.3	......	
Mississippi.					
Aberdeen	102	52	78.6	3.30	
Agricultural College	94	59	77.4	4.48	
Austin †	91	59	78.3	3.00	
Batesville †	93	55	76.4	5.72	
Bay St. Louis †	94	66	80.2	......	
Biloxi †	98	65	82.8	7.40	
Briers †	94	61	79.4	5.16	
Brookhaven †	102	50	77.7	6.36	
Canton †	94	57	78.3	3.45	
Columbus *a* †	......	......	......	4.26	
Columbus *b*	104	56	79.8	3.83	
Corinth	95	46	73.0	1.76	
Crystal Springs †	98	57	79.8	7.36	
Edwards	98	57	81.3	3.46	
Enterprise †	99	56	77.5	5.57	
Fayette †	98	55	80.2	3.82	
French Camps †	95	50	76.0	4.40	
Fulton †	96	50	76.8	1.13	
Greenville *a*	94	60	79.6	0.92	
Greenville *b* †	99	52	80.3	0.71	
Hernando	96	53	77.4	0.20	
Holly Springs †	97	56	77.6	1.78	
Itta Bena	95	54	78.8	2.86	
Jackson †	98	56	79.2	3.98	
Lake †	95	55	76.6	5.92	
Leakesville †	94	57	78.6	7.05	
Logtown †	94	62	79.3	8.50	
Louisville †	......	55	......	3.50	
Macon	100	57	80.1	3.68	
Magnolia †	99	55	79.9	6.98	
Natchez †	96	54	79.6	3.00	
Okolona	99	51	79.8	1.48	
Palo Alto †	96	63	77.9	3.78	
Pontotoc †	96	56	77.8	3.83	
Port Gibson †	98	54	77.8	4.57	
Rosedale †	96	51	78.2	1.25	
Stonington *[1]	98	64	79.8	......	
Thornton †	96	57	80.2	2.64	
Topton *[5]	94	64	79.0	4.50	
University †	92	56	76.1	4.99	
Water Valley *†[1]	95	56	75.4	7.12	
Waynesboro *a*	96	56	77.2	8.40	
Waynesboro *b* †	98	56	78.6	9.60	
Williamsburg	92[d]	65[d]	79.0[d]	6.43	
Woodville †	96	57	78.4	4.63	
Yazoo City †	100	52	81.6	3.08	
Missouri.					
Akron	......	......	......	1.80	
Arlington †	......	......	......	3.96	
Arthur *†[3]	57	73.1		3.97	
Bagnell †	......	......	......	7.98	
Bethany	95	48	71.4	3.34	
Birchtree	92	50	71.5	4.18	
Bolckow	......	......	......	1.35	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	Ins.	Ins.
Boonville †	......	......	......	2.22	
Brunswick	91	51	71.2	5.42	
Carrollton †	93	50	72.7	3.85	
Cedargap *[1]	92	52	72.5	3.24	
Conception	88	50	70.7	2.88	
Cowgill *[5]	92	50	72.1	2.65	
Darksville †	94	50	72.5	4.98	
Downing	......	......	......	1.36	
East Lynne *[3]	......	49	68.8	1.49	
Edgehill *[5]	90	58	73.2	8.29	
Eightmile *[1]	89	50	69.8	2.49	
Eldon *[1]	90	50	71.9	4.70	
Elmira	96	45	72.8	2.26	
Emma	......	......	......	2.30	
Fairport	......	......	......	1.59	
Farmersville	......	......	......	1.21	
Fayette	90	51	72.2	3.35	
Fulton	......	......	......	3.15	
Gallatin *[1]	92	52	70.9	1.89	
Gayoso *[3] *b*	......	60	74.0	5.50	
Gordonville *[3]	......	58	71.7	2.69	
Gorin *[3]	95	53	72.0	2.87	
Grovedale	101	48	74.2	5.98	
Halfway	91	49	72.5	6.34	
Harrisonville †	98	50	71.6	1.14	
Hastain	100	49	75.0	9.97	
Hermann †	......	......	......	4.49	
Houston	98	45	72.3	7.08	
Houstonia (near)	......	......	......	2.10	
Irena	......	......	......	2.27	
Ironton †	89	50	71.2	6.93	
Jefferson City †	96	50	74.6	4.35	
Kidder	91	46	70.8	1.33	
Lamar	93	52	74.0	3.38	
Lamonte	......	......	......	2.90	
Lebanon	90	52	73.2	8.56	
Lexington †	91	52	71.6	3.46	
Liberty	95	49	73.4	6.02	
McCune *†[1]	96	54	72.1	6.09	
Macomb	......	......	......	4.09	
Mansfield	......	......	......	3.45	
Marblehill	91[e]	49[e]	73.4[e]	5.64	
Marceline	98	45	72.8	3.47	
Marshall †	98	45	72.8	2.22	
Maryville	94	46	70.4	2.38	
Mexico †	93	50	72.8	9.72	
Miami	......	......	......	2.06	
Mine La Motte †	86	51	70.7	3.60	
Mineralspring	93	45	73.4	3.41	
Montreal *[1]	88	54	70.5	4.94	
Mount Vernon	98	46	70.2	2.43	
Neosho	96	48	73.6	7.18	
Nevada	......	......	......	3.04	
New Haven *[1]	94	58	76.8	4.87	
New Madrid	93	56	77.1	4.18	
New Palestine *†[1]	89	55	73.2	3.10	
Oakfield †	92	53	73.6	5.23	
Oakmound	......	......	......	5.07	
Olden †	94	50	72.7	3.88	
Oregon *a*	92	50	71.8	2.52	
Oregon *b* *[1]	91	48	71.0	2.71	
Osceola †	......	......	......	2.80	
Oto	......	......	......	3.50	
Palmyra *[5]	96	54	76.4	3.40	
Phillipsburg *†[1]	93	55	71.5	4.49	
Pickering *[3]	......	49	69.7	0.94	
Platte River *[3]	93	54	70.8	4.47	
Poplarbluff	......	......	......	5.10	
Potosi	95	......	......	6.61	
Princeton *[1]	101	48	71.7	0.77	
Rhineland	91	52	72.2	3.76	
Richmond *[1]	92	53	73.2	2.35	
Rolla	......	......	......	3.96	
St. Charles	95	54	72.6	6.14	
St. Joseph †	......	......	......	3.13	
St. Louis	90	52	71.8	4.48	
Sarcoxie *[3]	93	54	72.4	2.16	
Shelbina	......	......	......	4.90	
Steffenville	......	......	......	4.21	
Stellada †	93	48	71.4	2.15	
Sublett	96	48	71.8	2.02	
Tindall †	......	......	......	1.10	
Trenton	92	52	71.4	1.45	
Unionville †	95	47	71.4	3.40	
Versailles	......	......	......	4.80	
Virgil City	......	......	......	3.38	
Warrensburg *[1]	95	57	74.3	1.18	
Warrenton	93	50	72.4	4.90	
Wheatland	......	......	......	3.37	
Willow Springs	93	49	72.0	4.18	
Zeitonia *[1]	97	60	75.8	5.19	
Montana.					
Agricultural College	89	32	61.2	2.65	
Bigtimber †	95	34	65.0	1.50	
Billings †	100	40	70.2	1.83	
Boulder	89	31	60.4	......	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bozeman †	92[c]	32[c]	62.5[c]	2.55	
Butte †	85	30	58.8	1.07	
Chinook †	105	44	68.8	1.51	
Choteau †	96	35	62.8	0.60	
Cokedale † [f]	93	32	60.6	1.57	
Columbia Falls †	100	29	61.6	1.10	
Dillon †	89	30	58.8	1.10	
Fort Custer †	99	35	66.8	7.50	
Fort Keogh †	99	42	68.6	1.61	
Fort Logan †	100	36	58.8	0.62	
Fort Missoula	96	30	59.3	0.86	
Glasgow †	98	39	66.0	2.41	
Glendive †	100	41	69.2	4.20	
Greatfalls †	95	40	64.4	1.14	
Hogan †	90	31	62.2	0.37	
Kalispel †	94	32	60.2	0.34	
Kipp †	94	30	55.8	1.34	
Lewistown †	89	34	59.8	2.33	
Libby †	104	29	61.0	0.40	
Livingston †	90[c]	34	62.9	0.35	
Manhattan †	91	31	61.0	1.02	
Martinsdale †	93	34	60.6	1.71	
Marysville †	87	36	60.0	1.11	
Musselshell †	102	32	65.8	......	
Poplar †	97	38	64.7	3.79	
Radersburg †	106	27	68.4	......	
Redlodge	90	29	60.1	4.12	
St. Ignatius Mission †	96	35	61.6	1.27	
St. Pauls †	93	40	62.9	2.01	
Troy †	98	33	60.2	0.62	
Utica †	95	33	63.2	2.35	
Virginia City †	86	31	60.8	1.25	
White Sulphur Springs †	97	27	57.0	0.56	
Wibaux	95	34	64.8	3.70	
Yale †	93	35	61.1	1.01	
Nebraska.					
Agee *[1]	92	51	69.2	4.35	
Albion †	96	43	70.4	5.83	
Ansley †	96	39	73.6	2.92	
Arapaho *[1]	99	50	71.9	7.85	
Arborville *[1]	92	46	69.8	4.16	
Arcadia	97	48	74.0	7.86	
Ashland *a* †	95	46	71.3	1.80	
Ashton	97	48	71.2	5.01	
Auburn *†[1]	96	50	73.0	3.10	
Aurora *[1]	93	55	72.5	3.40	
Bassett	94	41	67.2	4.29	
Beatrice †	97	47	71.7	5.27	
Beaver City †	104	45	73.0	5.83	
Benkelman *[1]	104	54	74.2	2.78	
Bluehill *[1]	98	50	72.8	7.52	
Bratton *[1]	97	52[c]	74.8[c]	2.52	
Brokenbow *[1]	94	60	78.0	4.89	
Burwell *[1]	92	58	75.5	4.70	
Callaway †	94	44	69.5	3.58	
Central City *[5]	94	62	79.4	4.72	
Chester *[1]	98	52	71.6	3.92	
Columbus †	92	44	69.6	4.42	
Creighton †	95	42	70.4	5.01	
Crete	94	46	70.9	3.71	
Culbertson	......	......	......	3.08	
Curtis *a* †	105	48	73.4	5.03	
David City *†[1]	94	50	69.8	2.80	
Dunning *[1]	92	54	71.4	4.18	
Edgar *[1]	97	55	73.6	3.50	
Elba	......	......	......	8.68	
Ericson *†[1]	99	59	75.0	4.86	
Fairbury †	90	53	72.5	5.77	
Fairmont *[1]	99	42	72.6	3.91	
Fort Robinson	94	41	67.2	1.30	
Geneva †	97	43	71.2	4.25	
Genoa †	94	47	70.3	5.47	
Gering †	103	40	69.2	3.44	
Gibbon	94	45	71.6	1.93	
Gothenburg	104	46	74.0	3.06	
Greeley	......	......	......	16.17	
Haigler *[1]	100	53	75.0	3.75	
Hartington †	94	41	67.9	7.74	
Harvard	93	54	71.7	1.85	
Hastings *[1]	94	50	70.6	4.20	
Hays Center †	......	......	......	3.31	
Hay Springs †	92	42	65.8	4.85	
Hebron †	96	44	70.5	4.45	
Hickman *[5]	92	50	75.0	4.53	
Imperial *a* *[1]	100	43	69.4	4.60	
Indianola *[5]	102[c]	50[d]	73.0[d]	3.59	
Indianola (near) *[1]	98	52	72.5	4.66	
Kearney *[1]	94	54	76.1	3.26	
Kennedy †	98	44	69.3	3.91	
Kimball †	93	40	68.1	1.48	
Kirkwood *[1]	90	50	67.8	5.24	
Lexington †	91	39	69.0	1.97	
Lincoln *b*	94	52	72.6	2.91	
Lodgepole †	95	41	68.7	3.29	
Loup *b* *[1]	90	50	69.8	11.78	
Lynch *†[1]	94	51	70.7	5.86	
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
McCook *[1]	102	50	76.1	3.61	
Madison *[1]	96	50	68.5	4.09	
Madrid *†[5]	96	45	71.8	3.75	
Marquette	......	......	......	4.24	
Milford *[5]	89	55	72.2	3.60	
Minden *a* *[1]	96	52	69.7	2.61	
Minden *b* †	......	......	......	2.08	
Nebraska City *a* *[1] [f]	92	44	70.0	3.64	
Nemaha *[1]	98	54	71.8	2.48	
Nesbit †	92	40	65.3	2.43	
Norfolk †	91	46	68.2	5.26	
Norman	100	46	71.8	2.18	
North Loup †	95	43	70.0	8.00	
Oakdale †	93	43	69.0	4.50	
Odell *[5]	94	52	73.7	5.58	
O'Neill	89	45	67.0	5.87	
Osceola	......	......	......	3.49	
Ough †	......	......	......	3.68	
Palmer *a* *[1]	98	54	70.8	4.35	
Plattsmouth *a* †	......	......	......	3.23	
Ravenna *a*	96	43	69.3	2.66	
Redcloud *b* *[1]	101	57	76.4	2.67	
Salem *[1]	94	60	76.4	2.84	
Santee Agency †	95	48	71.0	4.25	
Schuyler	......	......	......	4.52	
Seneca *[1]	94	49	72.8	2.00	
Seward *[5]	95	56	74.2	2.51	
Springview	96	44	69.2	6.05	
Stanton *[1]	94	48	69.2	3.03	
State Farm	93	47	69.6	2.88	
Strang *[1]	96	56	71.0	3.60	
Superior *[5]	94	54	74.0	2.72	
Sutton	94	46	69.2	4.67	
Syracuse	......	......	......	3.47	
Tecumseh *a* †	97[d]	47[d]	71.1[d]	3.26	
Tekamah	95	48	71.2	4.25	
Thedford *[1]	96	48	71.1	4.80	
Turlington †	94	49	71.6	2.39	
Valentine †	92	43	68.0	4.48	
Wakefield	......	......	......	5.46	
Wallace *[1]	98	50	72.2	3.38	
Whitman *[1]	92	40	67.9	2.63	
Wilber *[1]	94	48	71.0	4.35	
Wilsonville *[1]	104	48	74.8	3.60	
York *[1]	102	56	76.6	3.32	
New Hampshire.					
Belmont	......	......	......	3.14	
Berlin Mills	85[d]	31[f]	59.8[f]	2.25	
Bethlehem	83	36	61.0	2.09	
Brookline *[1]	90	42	64.7	1.92	
Concord	89	34	61.2	2.35	
Durham	92	42	64.6	3.04	
Grafton †	89	34	61.2	1.24	
Hanover	85	38	62.2	2.31	
Keene	88	35	61.9	1.46	
Lakeport	......	......	......	2.76	
Mine Falls	......	......	......	1.61	
Nashua	92	40	64.7	1.78	
Newton	90	41	63.6	1.62	
North Conway	88	38	62.5	2.40	
Pennichuck Station	......	......	......	1.18	
Peterboro	88	38	66.6	1.59	
Plymouth	92	34	61.8	1.34	
Sanbornton †	85	38	60.7	3.04	
Warner	......	......	......	1.50	
Weirs Bridge	......	......	......	1.68	
Wolfboro	......	......	......	1.92	
New Jersey.					
Allaire	92	41	67.4	......	
Asbury Park	96	47	68.8	3.59	
Barnegat	92	46	67.7	4.30	
Bayonne	93	48	69.1	6.99	
Beachhaven	90	52	68.0	4.74	
Belvidere	92	42	67.4	4.41	
Beverly †	93	46	69.7	5.22	
Billingsport *[1]	94	58	71.0	6.60	
Blairstown	90	42	66.4	3.68	
Boonton	91	44	67.0	4.96	
Bridgeton	91	52	71.4	7.58	
Camden	90	50	69.3	4.82	
Cape May	84	49	68.4	2.64	
Cape May C. H. †	88	50	68.7	4.46	
Charlotteburg	88	37	63.4	5.02	
Chester	90	45	65.4	6.04	
College Farm †	90	42	68.1	4.93	
Deckertown	89	39	66.6	4.52	
Dover	95	40	65.8	3.55	
Egg Harbor City	96	46	68.6	7.09	
Elizabeth †	93	47	68.4	7.21	
Englewood	92	42	66.2	5.87	
Franklin Furnace	90	40	65.8	5.29	
Freehold	89	46	67.4	3.80	
Friesburg	......	......	......	6.59	
Gillette	90	39	65.6	5.26	
Hanover	89	41	66.2	4.77	
Hightstown	93	46	69.2	4.00	
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Imlaystown	94	46	70.0	3.46	
Junction	......	......	......	3.30	
Lambertville	93	47	69.4	3.80	
Linwood	88	45	68.2	13.07	
Millville	95	45	70.4	7.70	
Moorestown	90	47	70.2	4.48	
Newark *a*	92	54	69.4	6.59	
Newark *b* †	92	50	68.6	6.60	
New Brunswick *a*	93	46	70.0	4.91	
New Brunswick *b*	90	45	68.4	4.86	
Newton	88	44	66.0	4.83	
Ocean City	85	49	68.9	13.45	
Oceanic	90	53	70.8	4.41	
Paterson	92	48	68.6	4.96	
Perth Amboy	93	47	68.2	6.68	
Plainfield	93	47	68.0	6.91	
Rancocas	......	......	......	4.50	
Readington *[1]	94[f]	58	73.0[c]	......	
Rivervale	92	39	65.8	6.10	
Sergeantsville *[1]	88	47	61.8	6.09	
Somerville	93	43	68.6	6.76	
South Orange	90	48	67.2	5.85	
Staffordville	......	......	......	4.46	
Toms River	97	42	68.6	4.81	
Trenton	92	52	71.5	3.72	
Vineland	95	45	70.0	9.67	
Woodbine	87	47	67.1	5.76	
New Mexico.					
Albert †	104	51	76.2	1.87	
Albuquerque †	100	55	77.6	0.32	
Alma †	101	40	73.3	0.30	
Aztec †	101	43	72.0	T.	
Bernalillo †	102	40	71.0	0.62	
Chama †	96	33	65.6	0.19	
Clayton †	100	40	73.7	1.51	
Deming *[8]	108	70	86.7	0.15	
East Lasvegas †	91	43	68.2	2.02	
Eddy †	111	57	81.4	2.57	
Engle †	101	48	78.0	0.27	
Espanola †	98	42	71.7	0.92	
Fort Bayard	99	46	73.7	......	
Fort Wingate	99	40	70.8	T.	
Galisteo †	101	50	74.2	0.84	
Gallinas Spring †	105	49	77.1	1.68	
Gila	109	48	79.5	1.33	
Hillsboro †	107	51	78.4	0.35	
Labelle †	85[c]	22	54.6[c]	1.13	
Las Cruces †	104	46	76.7	1.01	
Lordsburg *[8]	98	78	87.9	0.30	
Los Lunas †	104	45	72.8	0.10	
Lower Penasco †	106	49	74.5	2.05	
Monero †	96	35	64.2	0.22	
Ocate †	95	36	65.4	1.90	
Puerto de Luna †	108	55	80.2	2.00	
Raton †	97	38	67.8	0.14	
Rincon †	114	48	82.3	0.32	
Roswell †	110	55	81.0	1.97	
San Marcial †	102	50	76.0	0.18	
Shattucks Ranch	101	44	72.4	3.00	
Socorro	104	56	78.0	0.43	
Springer †	104	41	71.6	1.61	
Sulphur Hot Springs	82	33	57.9	0.27	
Valley Ranch	93	41	67.5	0.73	
White Oaks	99	52	73.8	0.45	
Winsors Ranch	......	......	......	1.73	
New York.					
Adams	......	......	......	1.88	
Addison	87	36	64.0	5.78	
Akron	......	......	......	2.32	
Alfred	85	36	62.1	4.07	
Angelica †	87	32	62.7	3.26	
Appleton	89	40	64.1	1.60	
Arcade	86	31	63.1	3.19	
Avon	92	37	67.0	1.97	
Baldwinsville	88	46	67.6	1.49	
Bedford	89	40	64.9	4.52	
Big Sandy *[10]	84	48	63.4	......	
Binghamton †	88	36	64.6	2.64	
Bloomville	90	36	63.2	3.31	
Bolivar	86	33	62.2	4.29	
Boyds Corners	......	......	......	3.47	
Brentwood	91[c]	40[c]	66.6[c]	5.00	
Brookfield	86	39	62.9	2.75	
Brooklyn	90	51	68.8	6.67	
Canton †	88	39	62.6	3.39	
Carmel	90	45	67.3	3.32	
Cherry Creek	......	......	......	2.93	
Cooperstown †	85	38	63.3	4.70	
Cortland	89	34	63.4	3.44	
De Kalb Junction	......	......	......	5.31	
Demster	......	......	......	2.33	
Dunkirk	......	......	......	3.09	
Eagle Mills	......	......	......	4.75	
Elmira †	90	45	67.7	3.31	
Fleming	88	46	66.4	2.41	
Fort Niagara †	90	41	65.6	1.79	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Friendship	80	32	64.1	3.22	
Fulton				2.49	
Glens Falls	92	40	64.6	3.01	
Gloversville	87	40	63.0	3.79	
Haskinville				3.19	
Honeymead Brook	87	42	64.3	2.40	
Humphrey †	86	38	62.9	3.63	
Ithaca	86	39	65.3	4.36	
Jamestown	85	40	64.4	3.39	
Kings Station				2.21	
Lebanon Springs	89	36	62.6	4.49	
Lockport	93	43	68.4	1.43	
Lowville	84	36	62.4	1.88	
Lyons	87	45	66.1	2.42	
Madison Barracks †	85	37	63.0	1.54	
Malone	82	40	62.0	4.57	
Manhattan Beach †				4.91	
Middletown	89	45	67.8	6.34	
Mohonk Lake	85	48	62.7	2.22	
Mount Morris				2.82	
Newark Valley				3.00	
New Lisbon	84	31	60.8	3.77	
North Hammond †	92	44	66.7	2.36	
Number Four †	81	33	59.0	2.81	
Ogdensburg	86	44	64.8	2.57	
Oneonta	90	36	65.0	3.39	
Oxford	90	34	63.8	2.96	
Palermo †	87	38	63.4	2.31	
Perry City	89	33	64.5	3.67	
Phœnix				1.54	
Pittsford	87	42	65.4	2.07	
Plattsburg Barracks †	89	45	64.1	2.80	
Port Jervis	89	43	66.2	5.54	
Potsdam	83	41	62.7	2.76	
Poughkeepsie	90	40	64.5	2.71	
Ridgeway				2.28	
Rome	89	40	65.2	1.51	
Romulus	89	42	66.2	2.43	
Rose †				1.32	
Saranac Lake	88	37	62.0	3.70	
Scottsville				3.08	
Setauket †	87	52	65.7	4.05	
Skaneateles				2.31	
South Canisteo	86	31	62.1	6.22	
Southeast Reservoir				4.00	
South Kortright †	88	32	61.6	2.75	
Tyrone				3.30	
Varysburg	90	35	66.0	3.06	
Victor	90	38	66.2	2.05	
Wappingers Falls	91	45	67.6	3.52	
Warwick				6.21	
Watertown	96	40	65.2	3.28	
Waverly †	92	33	65.0	2.85	
Wedgwood	92	41	66.0	6.23	
Westfield	85	40	66.5	2.90	
Westpoint †	91	42	65.4	4.07	
Willetspoint	89	50	66.4	6.01	
North Carolina.					
Asheville †	87	47	68.6	4.46	
Beaufort †	87	65	76.1	2.69	
Biltmore	88	44	68.8	3.65	
Bryson City †				9.05	
Chapelhill †	97	56	75.8	5.06	
Currituck Inlet †				3.60	
Edenton †	89	58	74.4	4.84	
Experimental Farm	92	58	75.3	3.85	
Fairbluff †				4.06	
Falkland *[1]	90	65	75.7	3.21	
Fayetteville †	92	57	75.3	7.15	
Flatrock	86	44	68.4	6.37	
Goldsboro	94	59	77.2	3.78	
Greensboro †	89	55	72.6	8.51	
Greenville				4.44	
Henderson †	94	59	74.5	5.60	
Highlands	80	41	63.4	6.74	
Horse Cove †	85	45	68.7	5.90	
Jacksonville †	92	58	76.8	3.20	
Jefferson †	88	42	67.3	5.58	
Lenoir *†[1]	87	56	71.1	2.70	
Linville †	78	39	63.0	4.62	
Littleton †	92c	55c	74.6c	3.60	
Louisburg †	91	55	74.5	4.72	
Lumberton †	94	59	77.5	4.51	
Lynn *†[2]	91		71.6	6.31	
Marion	90	52	71.5	8.36	
Mocksville †	92	54	74.6	4.11	
Moncure †	93	54	74.2	5.13	
Monroe	92	54	74.0	7.38	
Morganton *†[1]	89	61	72.2	4.13	
Mountairy †	90	49	70.8	6.85	
Mount Pleasant	90	54	73.8	4.33	
Murphy †				6.33	
Newbern †	90	65	77.2	2.02	
Oakridge †	91	60	72.8	10.08	
Pantego				11.57	
Pittsboro	89	58	73.2	7.11	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rockingham †	96	57	76.8	6.34	
Roxboro †	92	53	72.2	4.28	
Salem †	96	51	71.6	6.96	
Salisbury †	95	53	74.2	3.91	
Saxon †	95	50	73.9	6.81	
Selma	94	52	75.2	2.52	
Settle	96	50	73.5	6.67	
Skyuka	81	50	65.4	6.39	
Sloan †	92	51	76.1	2.92	
Soapstone Mount †	92	49	71.5	5.52	
Southport †	88	60	76.8	7.02	
Springhope *[1]	91	61	73.9	5.45	
Tarboro	93	54	75.7	5.16	
Waynesville †	87	44	67.9	5.14	
Weldon †	93	56	75.0	6.17	
Wilkesboro †	92	42	71.0	4.04	
Willeyton	91	56	74.2	10.18	
North Dakota.					
Amenia	91	43	65.7	2.25	
Ashley †	90	40	66.8	4.20	
Bottineau †	88	42	63.6	5.94	
Buxton	87	41	64.4	5.38	
Churchs Ferry	94	46	65.2	4.68	
Coalharbor †	91	44	64.9	3.55	
Dickinson †	87	28	61.3	2.54	
Ellendale				2.23	
Falconer	98	41	64.8	3.00	
Fargo †*[6]	88		67.6	2.41	
Forman †	93	37	65.3	3.31	
Fort Berthold †	96	38	67.1	7.08	
Fort Yates †	94	40	67.7	3.55	
Gallatin †	93	41	64.9	2.18	
Glenullin †	93	40	65.4	5.92	
Grafton †	88	41	65.2	3.31	
Grand Rapids	93	38	64.6	3.22	
Jamestown †	89	45	66.6	2.04	
Kelso †[4]	97	38	65.2	0.94	
Lakota †	86	45	64.8	3.82	
McKinney	88			6.82	
Medora †	95	41	67.1	4.97	
Milton †	98	43	65.2	5.07	
Minto †	94	43	67.5	2.93	
Napoleon †	95	40	65.4	3.44	
New England City †	96	40	65.5	3.40	
Oakdale †	89	38	63.5	5.08	
Portal †	96	40	66.4	4.24	
Power †	89c	42c	66.2c	3.52	
St. John †	85	45	63.4	4.35	
Sheyenne	96	43	67.0	5.30	
Steele †	93	43	65.5	2.18	
Towner †	89	44	63.6	6.30	
University †	86	49	65.5	3.15	
Wahpeton †	91	43	66.2	5.76	
Wildrice †*			67.2	2.20	
Willow City *	94	44	64.2	3.18	
Woodbridge †	85	41	62.7	3.77	
Ohio.					
Akron	88	43	67.8	7.79	
Ashland	91	41	68.2	3.70	
Ashtabula	87	42	66.5	6.14	
Athens	89	45	70.3	6.54	
Atwater				4.36	
Auburn	91	33	65.0	5.93	
Bangorville	92	44	69.2	3.76	
Basil				6.97	
Bement [1]	90*	37	65.5	9.31	
Benton Ridge	93	38	69.7	5.18	
Berlin Heights	93	39	68.4	3.43	
Bethany	98	47	72.7	4.12	
Bigprairie	91	38	67.4	4.45	
Binola	91	43	72.0	9.92	
Bissells	86	37	68.9	7.34	
Bladensburg	89	39	67.6	5.53	
Bloomingburg	94	44	68.8	3.15	
Bowling Green	95	40	68.7	3.19	
Caledonia †				4.25	
Cambridge	89	40	67.6	6.68	
Camp Dennison	93	48	72.8	4.28	
Canal Dover	90	38	68.0	6.04	
Canfield				7.23	
Canton †	88	41	68.4	8.48	
Carrollton	89	36	65.8	6.39	
Cedarville				3.92	
Celina	91	48	70.7	3.10	
Cherryfork	99	42	72.6	4.17	
Circleville *b*	88	46	70.2	7.08	
Clarksville	90	47	70.4	5.10	
Cleveland (V. O.)	88	44	67.0	6.48	
Clifton	93	43	70.0	3.67	
Coalton	92	38	72.2	5.79	
Colebrook	88	36	69.4	4.78	
Dayton *a*	93	48	72.0	4.34	
Dayton *b* †				5.17	
Defiance	96	44	70.0	1.63	
Demos	84	50	69.2	6.92	
Dupont	92	42	70.2	3.44	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Elyria	92	40	67.6	5.99	
Fairport Harbor *[10]	84	50	67.7		
Fayetteville	92	45	71.7	2.17	
Findlay	94	43	70.6	5.23	
Fostoria	90	45	71.9	3.58	
Frankfort	88	44	69.0	3.72	
Garrettsville †	88	36	65.3	4.76	
Granville	90c	40c	69.1c	5.54	
Gratiot	86	43	68.0	4.69	
Greenfield	90	50	71.2	2.71	
Greenhill	91	33	66.8	5.54	
Greenville	86	47	68.0	4.77	
Hackney	91	42	71.0	6.60	
Hanging Rock	93	45	71.0	4.76	
Hedges	93	39	68.4	3.11	
Hillhouse	89	35	60.4	5.92	
Hillsboro †	95	43	72.2	4.75	
Hiram	87	42	67.2	3.95	
Hudson	91	37	71.0	7.70	
Jacksonboro	95	48	71.8	3.95	
Kenton †	91	43	69.4	4.31	
Killbuck	88	39	67.8	5.59	
Lancaster	87	45	67.8	4.42	
Leipsic	96	40	69.4	3.63	
Levering	92	34	66.8	3.45	
Logan	92	42	70.0	6.08	
Lordstown	87	36	61.0	5.13	
Lowell	94	41	71.0	7.48	
McArthur	89	42	68.9	3.86	
McConnelsville †	92	44	70.2	6.44	
Mansfield †				3.96	
Marietta *a* †				5.38	
Marietta *b*	90c	47c	69.7c	5.81	
Marion	91	39	69.3	3.43	
Medina	91	36	61.8	4.54	
Milfordton	90	38	69.2	4.91	
Milligan	95	40	70.2	6.35	
Millport	86	56	71.9	4.43	
Montpelier	93	44	68.9	3.49	
Napoleon	94	42	70.0	3.49	
Neapolis				3.57	
New Alexandria	88	44	69.0	5.31	
New Berlin	91	38	68.1	6.15	
New Bremen	93	42	69.0	2.83	
New Comerstown	90	40	69.6	5.77	
New Holland	91	43	70.2	5.09	
New Moscow				6.35	
New Paris	93	42	71.3	3.33	
New Waterford				8.09	
North Lewisburg	92	44	69.4	4.30	
North Royalton	90	39	67.4	8.51	
Norwalk	94	35	69.4	2.10	
Oberlin	92	38	70.6	1.80	
Ohio State University	89	44	68.8	4.12	
Orangeville	93	36	67.4	5.52	
Ottawa	97	42	70.1	5.09	
Pataskala †	90	41	68.5	5.32	
Peoli	91	43	70.0	5.00	
Philo	92	45	70.0	6.36	
Plattsburg	88	46	69.0	3.67	
Pomeroy	96	46	72.4	4.69	
Portsmouth *a* †				4.55	
Portsmouth *b*	96	52	73.6	3.73	
Richwood				4.27	
Ridgeville Corners	91	41	68.4	3.47	
Ripley	90	49	71.3	7.25	
Rittman	90	36	65.7	2.37	
Rockyridge	94	43	70.0	1.44	
Rosewood	89c	44c	68.6c	2.73	
Sharon Center	95	52	72.8	6.07	
Shenandoah	92	40	67.6	2.97	
Sidney *b*				2.65	
Sinking Spring †	90	48	70.1	2.81	
Springboro				8.75	
Spring Valley	91	46	69.7	4.79	
Strongsville				9.65	
Sylvania	94	43	67.6	3.12	
Thurman	96	48	73.6	4.45	
Tiffin †	89	43	69.0	4.67	
Upper Sandusky	88	42	68.2	5.77	
Urbana	86	47	69.0	5.11	
Vanceburg	92	51	72.9	3.08	
Van Wert	92	43	69.1	2.98	
Vermilion	89	39	66.1	2.37	
Vickery	95	40	73.8	3.34	
Walnut				8.23	
Warren	92	37	67.9	10.78	
Warsaw	95	35	68.6	6.76	
Wauseon	92	45	69.6	4.12	
Waverly	95	46	73.4	3.86	
Waynesville	96*	49	73.0	4.89	
Westerville	89	43	69.0	5.44	
Willoughby				3.90	
Wooster *a*	87	39	65.6	3.98	
Wooster *b* †				3.54	
Youngstown	90	40	67.6	5.31	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Oklahoma.					
Alva †	105	48	77.6	4.65	
Anadarko †	107	51	83.9	1.03	
Arapaho †	106	48	77.6	5.04	
Beaver †	112	46	81.1	2.08	
Burnett †	99	53	76.2	1.14	
Clifton †	99	48	76.9	3.12	
Edmond				4.00	
Enid †	103	50	78.0	4.81	
Fort Reno †	104	50	78.5	1.29	
Fort Sill	103	54	80.9	1.38	
Guthrie †	98	51	75.2	6.01	
Keokuk Falls †	100	52	78.2	3.90	
Mangum †	105	51	81.6	3.38	
Norman †	109	53	78.7	3.23	
Ponca †	98			3.76	
Pondcreek †	104	45	77.1	4.76	
Prudence †	107	50	79.4	3.97	
Sac and Fox Agency †	99	50	75.4	3.30	
Stillwater †	100	49	74.8	7.26	
Winnview †	105	45	79.4	3.71	
Woodward †				5.30	
Oregon.					
Albany *a* †	97	40	61.6	0.51	
Arlington †	100	41	67.7	0.12	
Ashland *b*	97	34	62.6	0.30	
Aurora *[8]	95	51	66.6	0.96	
Aurora (near)	92	36	59.2	1.27	
Bandon	69	42	56.2	0.16	
Bay City	87	37	57.4	4.15	
Brownsville *[8]	93	50	64.8	0.55	
Cascade Locks	94	42	63.2	3.02	
Comstock *[8]	92	45	61.0	0.25	
Corvallis *a*	95	37	59.2	0.98	
Corvallis (near)	93	40	61.2	0.61	
Dayville †	100	35	64.1	0.24	
Detroit †	94	35	59.4	1.18	
Eugene † *a*	93	40	59.8	0.36	
Eugene † *b*				0.39	
Fife †	87	24	56.4	T.	
Forest Grove	93	37	60.1	0.60	
Fort Klamath	85	24	55.6	0.35	
Gardiner	90	43	57.6	1.28	
Glenora	94	33	57.5	4.43	
Grants Pass *a* †	100	34	63.9	0.10	
Happy Valley	93	24	59.6	0.34	
Hood River (near)	91	41	61.6	0.54	
Hubbard	91	40	61.2	1.16	
Jacksonville	94	35	62.8	0.25	
Joseph †	90	30	57.8	1.16	
Junction City *[8]	98	45	63.4	0.35	
Lafayette *[8]	96	50	65.8	0.53	
Lakeview †	89	31	61.7	0.10	
Langlois	82	43	60.7	0.79	
Lorella	96	36	66.6	0.00	
McMinnville *a* †	93	36	60.3	0.80	
Merlin *[8]	104	52	68.9	0.00	
Monmouth *[8]	94	32	66.4	0.23	
Mount Angel †	97	43	63.2	1.37	
Nehalem				5.71	
Newberg *c*	94	38	61.0	1.04	
Newbridge	102	40	67.0	0.28	
Newport	93	40	55.6	2.35	
Pendleton	105	36	65.0	0.97	
Riddles *[8]	94	44	61.2	0.00	
Salem *b* †	93	41	60.6	0.99	
Salmon	87	27	49.8	3.33	4.0
Sheridan *[8]	89	51	62.8	0.42	
Silver Lake *c*	91	22	56.9	0.30	
Silverton *[8]	94	50	63.3	1.39	
Siskiyou *[8]	92	41	66.3	1.14	
Springfield *[8]	90	40	62.3	0.00	
Stafford	92	36	59.7	1.26	
The Dalles †	98	42	66.6	0.10	
Toledo	70	28	48.9	7.62	
Umatilla †				0.01	
Vale	98	35	65.4	1.13	
West Fork *[8]	106	42	64.4	0.12	
Weston	99	34	61.0	0.72	
Pennsylvania.					
Altoona	88	46	68.9	7.69	
Aqueduct	98	47	70.4	4.85	
Beaver Dam †				6.07	
Bethlehem				3.60	
Blooming Grove	88	38	65.0	2.49	
Brookville †				4.42	
Browers Lock				3.51	
Cameron				5.75	
Canonsburg	84[e]	50[e]	70.0[e]	6.71	
Carlisle	94	45	68.8	4.27	
Cassandra	83	38	67.4	6.33	
Cedarrun				5.23	
Centerhall †	87	43	66.2	4.06	
Chambersburg †	90	42	67.8	7.19	
Coatesville	91	43	68.0	2.85	
Confluence †				4.77	
Coopersburg	88	47	67.6	3.45	
Pennsylvania—Cont'd.					
Davis Island Dam †				4.47	
Doylestown				4.07	
Driftwood				6.97	
Dubois †				5.22	
Duncannon				5.56	
Dyberry †	88	34	62.8	1.89	
East Bloomsburg				4.85	
East Mauch Chunk	91	39	66.2	5.52	
Easton	90	46	68.6	3.98	
Edinboro *[1]	85	42	64.9		
Ellwood Junction †				5.93	
Emporium	88	38	64.8	6.75	
Farrandsville				4.82	
Forks of Neshaminy *[1]	88	57	69.8	4.46	
Frederick				5.24	
Freeport †				3.90	
Girardville				5.14	
Grampian	84	40	66.6	5.76	
Greensboro †				5.26	
Hamburg	92	44	69.0	4.03	
Hollidaysburg *	90	37	66.8	7.38	
Huntingdon *a* †	90	38	67.5	7.74	
Huntingdon *b*				7.93	
Indiana	92	37	69.6	9.11	
Johnstown †	90	40	68.6	6.03	
Karthaus				3.43	
Keating				5.10	
Kennett Square	91	45	68.3	5.10	
Lancaster *	89	43	70.4		
Lansdale				5.57	
Lebanon	91	41	67.4	4.51	
Leroy †	88	42	64.8	2.66	
Lewisburg	91	39	66.6	4.70	
Lock Haven *a* †	93	41	68.6	4.38	
Lock Haven *b*				3.67[a]	
Lock No. 4 †				4.00	
Lycippus	87	49[a]	70.0[b]	3.98	
Mifflin				4.14	
Oil City †				6.88	
Ottsville				3.36	
Parker †				4.11	
Philadelphia *b*	92	51	70.6	5.30	
Point Pleasant				5.34	
Pottstown	92	48	70.0	3.01	
Quakertown	92	40	66.4	3.03	
Reading[3]			69.5	2.85	
Renovo				7.32	
Ridgway †				5.57	
Saegerstown	90	35	64.5	6.97	
St. Marys *[1]	82[d]	32	63.6[d]	7.47	
Salem Corners	88	45	65.6	2.01	
Scranton	90	44	67.2	1.99	
Seisholtzville				3.83	
Selinsgrove	95	40	66.8	2.49	
Shawmont				4.04	
Shinglehouse	88	32	62.6	3.96	
Sinnamahoning				4.04	
Smethport	86	34	63.0	5.38	
Smiths Corners				4.55	
Somerset	86	35	63.4	7.68	
South Bethlehem *[1]	89	58	70.9		
South Eaton	85	38	65.1	2.62	
Spruce Creek				6.46	
State College	86	42	65.6	5.02	
Sunbury				2.10	
Swarthmore	91	50	71.8	4.90	
Towanda	90	35	65.6	2.17	
Uniontown	88	43	69.0	3.12	
Warren †				4.07	
Wellsboro *†[1]	86	34	60.2	3.92	
West Chester	89	50	68.9	5.84	
West Newton †				4.21	
White Haven *[1]	93	53	68.0	3.83	
Wilkesbarre †	94	40	68.7	2.40	
Williamsport	88	43	66.8	3.98	
York †	91	42	68.1	3.92	
Rhode Island.					
Bristol	83	49	66.2	3.61	
Kingston	86	43	63.3	5.01	
Lonsdale				3.26	
Pawtucket	87	49	66.4	3.49	
South Carolina.					
Allendale †	100	56	79.4	3.66	
Anderson †				4.73	
Batesburg †	99	55	77.2	5.30	
Blackville †	101	57	79.6	5.61	
Camden †				3.55	
Cheraw *a* †	99	56	77.4	5.61	
Cheraw *b* †				5.82	
Clemson College	100	52	78.0	1.94	
Conway †				6.69	
Darlington (near)				8.92	
Edisto †				6.26	
Effingham †				6.34	
Florence †	97	60	79.3	5.49	
Georgetown †	96	62	79.4	5.33	
South Carolina—Cont'd.					
Gillisonville †	102	54	79.7	6.86	
Greenville †	91	52	73.2	4.56	
Greenwood †	96	58	79.0	4.21	
Holland †	96	56	76.8	4.00	
Kingstree *a* †	100	57	79.3	7.98	
Kingstree *b* †				7.90	
Little Mountain	100	54	78.0	4.58	
Longshore †	94	56	76.0	4.18	
Mount Carmel †				2.09	
Pinopolis *[1]	91	64	76.4	7.43	
Port Royal †	97	64	80.5	7.38	
St. George †	96	60	78.0	10.45	
St. Matthews †	96	60	77.8	5.49	
St. Stephens †				9.16	
Santuck †	95	55	75.6	3.56	
Shaws Fork *[1]	102	62	80.1	4.01	
Smiths Mills †				5.99	
Society Hill †	91	59	75.8	5.96	
Spartanburg †	97	53	77.1	3.18	
Statesburg †	95	58	77.2	4.54	
Trenton	96	60	78.6	3.50	
Trial †	95	58	77.0	5.87	
Winnsboro	100	55	76.8	3.08	
Yemassee †	100	58	79.8	5.11	
Yorkville	94	56	75.7	5.05	
South Dakota.					
Aberdeen †	93	43	66.4	6.26	
Alexandria †	93	42	67.0	4.47	
Armour †	93	41	69.2	3.81	
Ashcroft †	98	33	65.1	4.50	
Brookings †	89	41	65.0	3.82	
Canton *[1]	93	43	64.4	6.55	
Castlewood †	94	38	65.0	4.15	
Clark †	89[c]	40[c]	67.6[c]	3.94	
Cross †	86	33	60.4	7.39	
Edgemont				1.25	
Farmingdale				4.69	
Faulkton †	94	38	66.5	2.50	
Flandreau †	92	42	65.6	6.47	
Forestburg †	98	37	67.8	5.63	
Forest City †	101	42	70.2	1.35	
Fort Meade †		42		2.62	
Gary †	94	44	68.6	3.45	
Goudyville *†[1]	97	49	67.8	2.14	
Greenwood †	96	44	70.7	5.97	
Highmore †	96	37	68.1	2.28	
Hitchcock				3.91	
Hotch City †	95	39	69.6	2.46	
Howard	91	40	64.7	2.99	
Kimball †				5.60	
Leslie †	104	39	71.4	3.75	
Mellette	92	40	67.3	3.81	
Menno †	93	42	69.0	3.62	
Millbank †	90	42	66.4	3.08	
Mitchell †	90	39	66.9	2.73	
Northville *[1]	98[e]	38[e]	65.8[e]	5.20	
Nowlin †	101	41	70.8	4.80	
Oelrichs †	96	36	68.7	1.32	
Parker †	97	39	68.0	4.77	
Parkston †				3.53	
Plankinton †	97	39	69.9	4.49	
Shiloh †	100	38	69.4	1.90	
Silver City				5.31	
Sioux Falls †	94	40	66.8	5.92	
Tyndall †	91	46	69.4	5.45	
Watertown † *c*	86	35	62.3	3.68	
Wentworth †	93	41	65.8	4.53	
Wessington Springs †	90	45	68.2	7.25	
Tennessee.					
Andersonville *[1]	90	53	75.0	5.11	
Arlington	99	56	77.2	2.32	
Ashwood *†[1]	92	60	74.7	4.50	
Benton (near) †	95	50	74.5	5.58	
Bolivar †	93	54	75.0	1.63	
Bristol † [e]	88	52	72.2	4.23	
Brownsville †	96	58	78.4	6.62	
Carthage †				4.04	
Clarksville †	88	55	73.3	4.68	
Clinton †				6.70	
Covington	98	56	78.0	3.06	
Decatur †	94	50	74.6	4.09	
Dyersburg †	96	58	77.6	5.29	
Elizabethton †	98	50	73.3	7.87	
Elk Valley *[1]	84	54	71.2	5.27	
Fairmount *[1]	86	58	70.0	3.54	
Florence †	89	54	73.7	3.42	
Greeneville †	87	50	70.6	6.82	
Hohenwald *†[3]		60	70.6	4.97	
Jackson †	91	55	75.2	4.58	
Johnsonville †	96	52	75.2	4.93	
Jonesboro *†[1]	86	56	71.0	6.48	
Liberty †	90	53	73.8	3.09	
Loudon †				5.15	
Lynnville *[1]	91	55	72.6	3.30	
McKenzie *†[1]	89	59	74.3	3.75	
McMinnville †	96	53	74.2	3.85	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Tennessee—Cont'd.					
Milan†	94	55	76.1	3.20	
Molino†	95	50	74.7	2.48	
Newport*3	92	53	74.3	5.76	
Nunnelly*1	89	61	73.4	4.66	
Palmetto†	91	54	74.4	2.91	
Pope*1	92	60	73.9	2.56	
Riddleton†	90	54	74.0	5.07	
Rockwood†	......	......	......	3.82	
Rogersville†	86	50	70.4	4.46	
Rugby*1	88	55	70.8	5.09	
St. Joseph†	94	49	73.9	8.45	
Savannah†	92	58	77.2	6.22	
Sewanee†	84	50	69.6	4.22	
Springdale*1	96	60	75.8	4.65	
Tellico Plains†	97	52	74.0	4.10	
Trenton	92	54	74.0	4.92	
Tullahoma†	87	48	70.4	3.95	
Union City†	93	55	75.8	7.55	
Waynesboro*1	90	51	71.8	5.43	
Texas.					
Albany*†1	95	50	78.8	0.64	
Arthur City†	......	......	......	0.87	
Aurora*1	104	56	82.8	0.30	
Austin b*5	101	58	82.1	......	
Ballinger†	107	49	82.2	2.06	
Beeville†	106	64	85.5	1.07	
Blanco†	104	......	......	0.50	
Boerne*†1	100	59	83.8	0.37	
Brady†	105	52	83.2	0.66	
Brazoria†	97	65	82.5	0.58	
Brenham†	100	61	84.2	0.90	
Brighton	92	65	82.1	0.34	
Brownwood*†1	107	52	81.9	1.61	
Burnet*†1	102	62	83.6	0.41	
Camp Eagle Pass†	110	68	89.2	1.52	
Chillicothe*	106	50	80.2	1.33	
Coleman*3	......	62	80.9	2.15	
College Station	99	55	82.3	0.10	
Colmesneil	......	......	......	1.30	
Columbia†	96	61	81.2	0.74	
Corsicana b†	106	57	84.1	0.58	
Cuero†	101	68	84.9	1.77	
Dallas†	103	53	81.8	0.50	
Danevang†	101	61	83.3	1.92	
Dean	104	50	77.7	1.13	
Dublin†	103	54	83.6	1.58	
Durham†	......	......	......	3.47	
Duval*1	108	68	87.6	0.42	
Estelle†	104	54	82.7	1.03	
Forestburg†	101	54	81.6	0.71	
Fort Brown†	101	66	84.0	0.85	
Fort Clark	109	66	87.1	1.02	
Fort McIntosh	104	67	86.7	0.75	
Fort Ringgold†	107	65	86.2	4.03	
Fort Stockton†	......	......	......	0.82	
Fort Worth	105c	56c	85.4c	1.02	
Fredericksburg*†1	99c	50c	83.8c	1.43	
Gainesville†	100	54	82.3	2.27	
Georgetown*1	96	60	82.0c	0.20	
Golindo	......	......	......	0.15	
Graham	106	48	84.6	2.38	
Grapevine†	104	55	82.2	1.84	
Hale Center†	102	54	79.0	3.65	
Hallettsville†	103	60	84.6	0.66	
Happy†	106	45	78.2	0.90	
Haskell†	108	52	86.5	T.	
Hearne†	101	61	84.6	0.25	
Henrietta	107	62	86.0	0.40	
Hewitt	......	......	......	0.80	
Houston†	98	66	83.2	1.21	
Huntsville†	101	56	83.9	0.45	
Kent	......	......	......	1.62	
Kerrville†	101	52	81.2	1.04	
Lampasas†	105	48	83.6	0.25	
Leakey†	101	57	82.6	0.73	
Llano*†5	105	57	88.4	0.00	
Longview†	103	55	83.1	3.41	
Lufkin	104	63	84.1	2.54	
Luling†	101	58	84.5	0.10	
Mann†	107	55c	83.6	0.28	
Menardville*†1	108	66	84.6	1.05	
Mount Blanco*†1	104	50	81.2	0.19	
New Braunfels†	99	60	83.4	0.12	
Orange†	......	59	......	0.71	
Panter†	......	......	......	0.47	
Paris†	102	60	81.6	0.29	
Point Isabel*1	90	80	85.6	T.	
Rheinland†	108	59	84.6	0.41	
Roby†	111	55	80.0	1.64	
Rockport*1	98	74	84.9	......	
Rocksprings†	107c	......	......	1.31	
Round Rock*1	96	76	88.4	0.00	
Runge†	101	68	84.9	1.54	
San Antonio	102	62	85.0	0.72	
San Marcos a†	......	......	......	0.00	
San Marcos b†	101	62	84.9	0.00	
Texas—Cont'd.					
Sierra Blanca†	104	50	80.6	1.54	
Stafford†	101	62	84.0	3.45	
Temple a†	101	61	83.5	0.47	
Temple b†	100	60	85.0	0.40	
Twohig	107c	64c	86.6c	0.00	
Tyler†	101	51	81.4	0.20	
Victoria	......	......	......	0.77	
Waco†	103	56	85.2	1.60	
Weatherford†	101	52	83.1	0.19	
Utah.					
Alpine City†	......	......	......	0.06	
Blue Creek*5	102	51	79.8	0.00	
Brigham City†	......	......	......	0.36	
Cisco†	109	47	77.2	0.02	
Corinne*8	99	60	83.7	0.12	
Fillmore†	106	35	73.1	0.01	
Fort Duchesne†	95	37	67.2	0.03	
Giles†	107	38	76.0	T.	
Grover†	96	34	63.8	0.05	
Heber†	94	28	64.6	0.09	
Kelton*8	96	59	75.4	0.00	
Levan†	95	36	68.0	0.36	
Loa†	96	30	63.5	0.35	
Logan†	90	39c	66.0	0.46	
Mammoth	93	42	68.6	0.12	
Manti†	106	34	69.2	T.	
Millville†	......	......	......	0.45	
Moab†	100	48	73.8	0.03	
Ogden a*8	97	58	74.5	0.10	
Pahreah†	99	40	71.8	0.00	
Park City†c	86	33	58.6	0.00	
Parowan†	96	41	68.5	0.08	
Promontory*1	100	45	73.6	0.00	
St. George†	112	43	78.5	0.00	
Scipio†	97	31	67.3	T.	
Snowville†	89	35	63.2	0.68	
Soldier Summit†	95	21	58.6	0.14	
Terrace*8	99	58	80.5	0.00	
Thistle†	96	40	68.6	2.00	
Tooele†	92	42	68.0	0.02	
Vernal	94	46	71.2	0.04	
Vermont.					
Brattleboro	92	39	64.7	1.33	
Burlington	89	49	67.2	3.13	
Chelsea†	83	39	59.8	1.78	
Cornwall	89	43	64.0	2.41	
Hartland†	85	35	60.5	2.60	
Jacksonville	85	34	59.7	1.85	
Norwich	88	36	60.5	2.28	
St. Johnsbury	84	37	61.8	2.42	
Strafford*†1	82	44	61.1	1.88	
Vernon*6	90	48	66.9	1.13	
Wells	88	40	64.0	2.88	
Woodstock	90	37	63.2	2.34	
Virginia.					
Alleghany*1	89	52	67.3	......	
Ashland†	95	49	72.1	3.67	
Bigstone Gap†	88	43	68.8	3.77	
Birdsnest*†1	90	63	74.9	1.35	
Blacksburg	85	43	67.3	5.38	
Buckingham†	90	50	71.0	4.41	
Burkes Garden	88	42	65.0	6.81	
Callaville†	91	53	72.9	5.91	
Christiansburg†	......	......	......	3.76	
Clarksville†	......	......	......	3.17	
Dale Enterprise†	88	45	68.0	5.17	
Danville†	......	......	......	4.60	
Fredericksburg†	91	53	72.3	5.41	
Goshen*1	88	50	70.2	......	
Grahams Forge†	85	44	67.7	5.05	
Hampton	88	62	74.5	7.24	
Hot Springs	80	44	63.9	3.79	
Lexington†	89	50	70.6	4.31	
Maidens	92	62	76.0	......	
Manassas†	94	44	71.6	4.68	
Marion†	88	46	69.5	6.54	
Monterey†	88	40	66.3	7.98	
Petersburg†	90	56	74.0	5.90	
Quantico	92	51	71.6	......	
Radford†	......	......	......	3.84	
Richmond (near)†	96	54	73.1	6.11	
Rockymount†	91	55	72.2	5.24	
Rural Retreat	85	43	66.5	6.51	
Salem†	87	54	70.4	4.79	
Saltville	86	45	69.6	5.37	
Smithville†	89	56	72.8	3.34	
Spottsville†	92	54	73.8	5.78	
Stanardsville†	88	50	69.1	3.13	
Staunton†	88	48	69.6	6.58	
Stephens City†	93	48	70.5	6.78	
Sunbeam†	92	60	77.8	8.18	
Warsaw†	92	55	73.6	5.80	
Westbrook Farm	91	52	73.6	......	
Wytheville†	87	48	67.6	7.15	
Washington.					
Aberdeen†	94	39	58.0	3.49	
Washington—Cont'd.					
Ashford†	......	......	......	3.25	
Blaine†	89	33	56.9	2.04	
Cascade Tunnel†	......	28	......	2.10	
Centerville†	96	36	61.8	0.16	
Chehalis†	101	37	62.6	1.35	
Colfax†	95	35	60.2	0.69	
Connell†	106	30	69.8	......	
Coupeville†	88	39	56.4	1.04	
Eastsound†	80	41	58.0	0.83	
Ellensburg†	95	40	61.4	0.17	
Ellensburg (near)	98	34	63.3	0.10	
Fort Simcoe†	103	41	67.8	0.17	
Fort Spokane	100	32	60.8	0.21	
Grandmound†	97	34	59.2	1.54	
Hunters†	89	31	54.8	0.90	
Lakeside†	97	45	66.0	0.09	
Lapush†	73	39	55.6	3.30	
Madrone*†1	89	38	58.8	0.98	
Mayfield†c	92	......	......	2.78	
Montecristo†	88	34	50.6	5.12	
Moxee Valley†	106	35	65.9	0.07	
New Whatcom†	78	39	60.2	2.06	
Olga†	79	38	56.8	1.29	
Olympia†	95	38	59.4	1.31	
Pine Hill†	95	39	62.6	0.23	
Pomeroy†	98	46	68.9	0.43	
Pullman†	94	37	60.2	1.06	
Queets†	89	35	55.6	4.67	
Rosalia†	94	34	59.3	0.71	
Shoalwater Bay*10	88	45	57.1	......	
Silvercreek*1	94	36	56.0	2.91	
Snohomish†	92	38	59.5	1.63	
Southbend†	90	35	59.8	4.01	
Stampede†	92	30	53.8	......	
Stillaquamish	93	33	57.1	2.30	
Sunnyside†	104	35	66.6	0.14	
Tacoma†	95	43	59.5	2.02	
Union City†	97	38	61.8	2.20	
Vashon†	88	39	59.0	1.62	
Waterville†	101	33	60.8	0.39	
Wenatchee Lake†	90	37	57.0	......	
West Ferndale†	95	43	60.4	2.52	
West Virginia.					
Beckley	90	37	67.3	3.98	
Beverly†	88	46	69.3	5.04	
Bloomery†	87	39	64.9	4.05	
Buckhannon a†	......	......	......	4.77	
Buckhannon b†	88	43	65.9	......	
Burlington†	90	41	68.2	5.41	
Charleston†	......	......	......	4.81	
Dayton†	......	......	......	5.53	
Elkhorn†	88	47	68.9	6.69	
Ella	89	50	69.7	2.11	
Fairmont†	......	......	......	4.59	
Glenville†	87	45	69.4	6.11	
Grafton†	90	43	69.2	4.01	
Green Sulphur	89	52	70.8	4.38	
Harpers Ferry†	......	......	......	5.25	
Hewett†	91	53	71.8	7.57	
Hinton a†	......	......	......	5.87	
Hinton b†	89	51	71.2	......	
Leachtown†	......	......	......	3.25	
Marlinton†	86	51	69.7	3.71	
Martinsburg†	91	48	69.8	7.54	
Monarch*†1	88	54	69.0	9.86	
Morgantown a†	......	......	......	3.74	
Morgantown b†	90	42	70.0	4.16	
New Martinsville†	90	45	69.8	6.81	
Nuttallburg†	90	43	67.2	7.40	
Oldfields†	92	42	69.4	3.41	
Pennsboro	91	44	68.2	6.71	
Philippi	91	49	71.2	4.71	
Point Pleasant†	94	48	72.8	3.08	
Powellton†	88	49	70.0	8.30	
Rowlesburg†	......	......	......	6.61	
Sandyville†	92	45	70.8	3.04	
Spencer†	95	50	71.3	2.91	
Tannery*1	84	46	65.0	......	
Weston a†	......	......	......	7.03	
Weston b*1	93	50	71.9	......	
Wheeling a†	......	......	......	5.63	
Wheeling b†	91	48	72.4	5.89	
White Sulphur Springs†	90	41	68.0	5.08	
Wisconsin.					
Amherst	87	37	66.1	6.20	
Antigo†	90	29	64.9	3.07	
Apollonia*†1	95	35	70.0	4.35	
Bayfield†	95	40	63.0	1.75	
Beloit	91	43	69.1	3.15	
Black River Falls	90	......	......	2.89	
Boscobel†	89	42	68.0	4.72	
Centralia	89	40	68.2	3.21	
Chilton	91	37	70.0	3.35	
Citypoint	92	35	69.0	3.37	
Crandon†	......	......	......	0.51	
Delavan†	92	38	67.4	3.01	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Depere†	87	39	66.6	3.84	
Eau Claire[1]	90*	36	71.3	6.25	
Florence†	86	30	62.6	1.83	
Fond du Lac†	88	39	66.8	3.44	
Grand River Lock	......	......	......	3.33	
Grantsburg†	92	46	67.6	3.47	
Hartford	......	......	......	2.36	
Harvey†	96	44	67.7	2.16	
Hayward†	......	......	......	3.21	
Hillsboro	93	41	66.0	3.38	
Koepenick *†[1]	86	48	67.9	1.90	
Lancaster†	89	43	67.8	3.94	
Lincoln †[2]	......	......	69.0	3.90	
Madison†	88	49	68.8	2.69	
Manitowoc†	88	41	64.0	1.88	
Meadow Valley†	88	40	66.6	2.70	
Medford†	94	29	66.3	4.10	
Menasha	......	......	......	3.16	
Neillsville†	88	36	66.0	3.21	
New Holstein	89	38	66.2	3.14	
New London	85	40	66.4	5.14	
Oconomowoc†	91	40	67.7	1.91	
Oconto	91	39	65.6	2.46	
Osceola†	93	33	66.2	6.63	
Oshkosh†	84	44	66.4	2.20	
Pepin	90	42	67.4	4.64	
Pine River†	89	42	67.3	4.12	
Portage†	92	44	69.0	3.15	
Port Washington	90	43	65.8	2.93	
Prairie du Chien	92	35	66.8	4.53	
Racine	91	44	66.3	1.92	
Sharon†	91	43	66.3	3.09	
Shawano	88	35	65.6	2.36	
Spooner†	96	38	64.7	3.99	
Stevens Point†	88	39	67.5	5.20	
Sturgeon Bay Canal	88	40	63.4	....	
Valley Junction†	87	36	65.9	3.04	
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Viroqua	87	44	67.7	6.83	
Watertown†	94	42	68.4	3.13	
Waukesha†	89	46	67.3	2.59	
Waupaca†	89	39	68.4	4.44	
Wausau†	87	37	67.2	5.02	
Westbend	88	40	66.5	1.97	
Westfield†	90	42	68.2	4.37	
Whitehall†	88	34	65.5	4.35	
Wyoming.					
Bighorn Ranch†	80	27	58.2	0.63	
Fort Laramie†	98	41	67.0	2.34	
Fort Washakie	88	35	61.8	0.60	
Fort Yellowstone	85	32	56.3	0.73	
Laramie	84	32	58.9	2.72	
Lusk†	95	35	66.0	2.27	
Sheridan	93	34	63.8	0.74	
Sundance	88	40	62.6	3.45	
Mexico.					
Ciudad P. Diaz	102	72	87.4	1.52	
Leon de Aldamas	93	50	73.4	1.56	
Mexico	84	43	66.8	1.21	
Puebla	86	50	65.8	5.78	
Topolobampo *[1]	92	80	85.1	0.06	
New Brunswick.					
St. John	74	43	58.5	3.17	
West Indies.					
Grand Turk Island	......	......	.....	0.83	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

‡ Record furnished by the Arrowhead Reservoir Company, in the San Bernardino Mountains, San Bernardino County, Cal., at elevations varying from 4,900 to 6,900 feet.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.

[2] Mean of 8 a. m. + 8 p. m. ÷ 2.

[3] Mean of 7 a. m. + 7 p. m. ÷ 2.

[4] Mean of 6 a. m. + 6 p. m. ÷ 2.

[5] Mean of 7 a. m. + 2 p. m. ÷ 2.

[6] Mean of readings at various hours reduced to true daily mean by special tables.

[7] Mean from hourly readings of thermograph.

[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.

[9] Mean of sunrise and noon.

[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

May, 1896, Table II, North Dakota, Batteau should be Bottineau.

March, 1896, page 79, line 10 from the bottom, for 6 p. m., read 3.20 p. m.

April, 1896, page 107, lines 3 and 4 from the bottom, for "middle Slope, 16.5, and Missouri Valley, 14.6," substitute "Ohio Valley and Tennessee, 6.9; lower Lake, 6.7; upper Mississippi, 5.8;" also line 2 from the bottom, for "Florida Peninsula, 9.7; east Gulf, 4.8," substitute "middle Plateau, 6.0; middle Pacific and south Pacific, 4.5."

May, 1896, page 148, line 31 from the bottom, add the following: "The greatest negative departures were: Northern Plateau, 6.6; middle Plateau, 5.8.

TABLE III.—*Data from Canadian stations for the month of June, 1896.*

Stations.	Pressure. Mean not reduced.	Pressure. Mean reduced.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Precipitation. Total.	Precipitation. Departure from normal.	Prevailing direction of wind.	Total depth of snow.
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
St. Johns, N. F	29.76	29.90	− .07	51.0	− 0.4	4.18	....	w.	0.0
Sydney, C. B. I	29.83	29.89	− .04	55.4	+ 0.9	3.47	− 0.22	sw.	0.0
Grindstone, G. St. L.	29.79	29.82	....	51.9	....	2.35	....	sw.	0.0
Halifax, N. S	29.81	29.94	.00	57.8	+ 0.3	4.66	+ 0.76	w.	0.0
Grand Manan, N. B.	29.86	29.91	....	56.4	....	3.57	+ 1.27	w.	0.0
Yarmouth, N. S.	29.86	29.94	+ .01	54.4	− 0.6	3.51	+ 1.37	nw.	0.0
St. Andrews, N. B.	....	....	....	57.8	....	3.45	+ 0.88	nw.	0.0
Charlottet'n, P. E. I.	29.83	29.87	....	57.0	....	3.78	+ 1.03	sw.	0.0
Chatham, N. B	29.86	29.88	− .02	59.4	+ 1.4	3.33	− 0.96	w.	0.0
Father Point, Que.	29.83	29.86	.00	52.3	− 0.7	3.37	+ 0.68	w.	0.0
Quebec, Que	29.56	29.88	− .01	61.0	+ 0.5	1.52	− 1.75	w.	0.0
Montreal, Que	29.72	29.92	+ .02	63.6	− 0.9	4.06	+ 0.87	sw.	0.0
Rockliffe, Ont.	29.42	29.92	+ .02	61.5	+ 3.5	2.40	− 0.35	nw.	0.0
Kingston, Ont	29.64	29.95	+ .01	63.4	+ 1.4	1.67	− 0.73	sw.	0.0
Toronto, Ont	29.59	29.97	+ .01	64.1	+ 2.6	1.11	− 1.61	n.	0.0
White River, Ont	28.64	29.96	....	60.2	+ 1.5	1.58	− 0.44	w.	0.0
Port Stanley, Ont	29.36	29.99	+ .04	64.8	....	3.49	+ 0.47	e.	0.0
Saugeen, Ont	29.26	29.96	+ .02	62.0	+ 4.0	1.42	− 0.95	n.	0.0

TABLE III.—*Data from Canadian stations*—Continued.

Stations.	Pressure. Mean not reduced.	Pressure. Mean reduced.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Precipitation. Total.	Precipitation. Departure from normal.	Prevailing direction of wind.	Total depth of snow.
	Inches.	*Inches.*	*Inches.*	°	°	*Inches*	*Inches.*		
Parry Sound, Ont.	29.28	29.96	+ .03	63.2	+ 4.2	0.92	− 1.29	nw.	0.0
Port Arthur, Ont	29.26	29.94	+ .03	59.3	+ 3.3	2.04	− 0.77	ne.	0.0
Winnipeg, Man	29.09	29.89	+ .04	65.0	+ 3.5	3.96	+ 0.12	se.	0.0
Minnedosa, Man	28.13	29.88	+ .06	62.6	+ 3.1	2.93	− 0.86	w.	0.0
Qu'Appelle, Assin.	27.66	29.86	+ .04	60.4	− 0.6	4.52	+ 1.17	s.	0.0
Medicine Hat, Assin	27.60	29.83	+ .04	66.2	+ 2.7	1.59	− 1.44	s.	0.0
Swift Curr't, Assin.	27.36	29.87	+ .05	62.8	+ 4.8	1.40	− 2.15	w.	0.0
Calgary, Alberta	26.39	29.84	− .01	59.2	+ 3.7	1.22	− 1.12	w.	0.0
Prince Albert, Sask.	28.31	29.79	....	59.0	....	2.40	....	nw.	0.0
Edmonton, Alberta.	27.59	29.88	+ .06	57.8	+ 1.3	2.62	+ 0.43	nw.	0.0
Battleford, Sask	28.18	29.87	....	60.9	....	2.26	....	nw.	0.0
Spences Br'ge, B. C.	29.16	29.96	....	65.9	....	T.	....	sw.	0.0
Hamilton, Bermuda	30.00	30.16	+ .04	75.6	....	4.09	....	s.	0.0
Banff, Alberta	25.40	29.97	....	52.6	....	0.80	....	sw.	T.
Esquimalt, B. C.	30.02	30.05	....	54.2	....	0.69	....	sw.	0.0
Ottawa, Ont	29.61	29.96	....	63.9	....	3.34	....	w.	0.0
May, 1896.									
Medicine Hat, Assin	27.53	29.82	− .04	51.0	− 4.5	3.10	+ 1.94	s.	0.0

TABLE IV.—*Meteorological observations at Honolulu, Republic of Hawaii, by Curtis J. Lyons, Meteorologist to the Government Survey.*

Pressure is corrected for temperature and reduced to sea level, but the gravity correction, −0.06, is still to be applied.

The absolute humidity is expressed in grains of water, per cubic foot, and is the average of four observations daily.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, connected by a dash, indicate change from one to the other; also same for force.

The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

June, 1896.	Pressure at sea level. 9 a. m.	Pressure at sea level. 3 p. m.	Pressure at sea level. 9 p. m.	Temperature. 6 a. m.	Temperature. 2 p. m.	Temperature. 9 p. m.	Temperature. Maximum.	Temperature. Minimum.	Humidity. Relative. 9 a. m.	Humidity. Relative. 9 p. m.	Humidity. Absolute.	Wind. Direction.	Wind. Force.	Cloudiness.	Rain measured at 6 a. m.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%					*Ins.*
1 ..	30.17	30.12	30.17	72	77	73	78	71	73	71	6.4	ene.	5	7-3	0.03
2 ..	30.18	30.09	30.16	70	78	74	80	69	66	66	6.4	ne.	5	3	0.02
3 ..	30.16	30.08	30.13	72	80	75	80	70	60	63	6.3	ne.	5	3	0.01
4 ..	30.16	30.08	30.12	73	80	74	81	72	66	66	6.2	ne.	4	5	0.00
5 ..	30.16	30.10	30.18	71	78	74	81	69	67	74	7.0	nne.	2	4-7	0.00
6 ..	30.16	30.11	30.16	72	79	76	80	69	57	66	6.5	nne.	4	3	0.12
7 ..	30.17	30.11	30.17	73	79	77	78	72	82	63	6.8	ene.	6	10	0.06
8 ..	30.16	30.10	30.16	72	76	75	79	71	71	74	7.1	ne.	6	5	0.08
9 ..	30.15	30.08	30.11	73	79	76	80	72	66	66	6.6	ene.	3	3	0.06
10 ..	30.09	30.04	30.05	73	80	76	81	72	63	74	6.8	ne.	5	3	0.00
11 ..	30.06	30.01	30.08	73	78	74	81	71	63	74	6.5	nne.	5	7	0.02
12 ..	30.09	30.06	30.11	73	74	75	80	72	67	70	7.2	ne.	5	5	0.04

TABLE IV.—*Meteorological observations at Honolulu*—Continued.

June, 1896.	Pressure at sea level. 9 a. m.	Pressure at sea level. 3 p. m.	Pressure at sea level. 9 p. m.	Temperature. 6 a. m.	Temperature. 2 p. m.	Temperature. 9 p. m.	Temperature. Maximum.	Temperature. Minimum.	Humidity. Relative. 9 a. m.	Humidity. Relative. 9 p. m.	Humidity. Absolute.	Wind. Direction.	Wind. Force.	Cloudiness.	Rain measured at 6 a. m.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%					*Ins.*
13 ..	30.12	30.09	30.12	74	79	75	80	73	66	66	6.3	ne.	4	4-8	0.08
14 ..	30.13	30.06	30.12	73	78	75	81	72	57	66	6.1	ne.	5	3	0.00
15 ..	30.15	30.12	30.17	68	77	72	78	68	66	73	6.3	nne.	5	7	0.12
16 ..	30.18	30.14	30.17	69	76	74	78	67	73	66	6.3	nne.	5	6	0.16
17 ..	30.16	30.09	30.12	72	79	72	79	69	73	77	6.4	nne.	4	8-4	0.23
18 ..	30.10	30.01	30.05	70	78	74	78	67	63	70	6.3	ne.	3	6-3	0.41
19 ..	30.05	29.99	30.04	69	79	75	79	67	66	70	6.7	ne.	1-4	5	0.07
20 ..	30.07	30.04	30.09	73	80	76	81	72	63	66	6.3	ne.	3-4	3-5	0.00
21 ..	30.05	30.05	30.10	72	80	76	82	71	74	70	6.8	ne.	1-3	6-3	0.02
22 ..	30.10	30.02	30.08	74	81	74	82	71	74	78	7.1	ne.	3	3	0.02
23 ..	30.11	30.04	30.08	71	81	74	83	66	64	74	6.9	ene.	1-3	2	0.00
24 ..	30.10	30.06	30.12	74	80	76	81	73	63	66	6.5	ene.	4	5	0.00
25 ..	30.16	30.12	30.15	74	80	76	82	73	63	66	6.4	ene.	3-5	3	0.00
26 ..	30.16	30.11	30.16	74	79	75	81	74	66	66	6.4	ne.	3-5	3	0.00
27 ..	30.16	30.04	30.08	74	78	74	81	74	64	74	6.9	ne.	5	3	0.00
28 ..	30.10	30.05	30.12	74	78	75	82	74	60	66	6.3	ne.	5	4	0.00
29 ..	30.09	30.03	30.10	73	79	74	81	70	63	66	6.3	ne.	3	4	0.04
30 ..	30.10	30.05	30.10	73	80	75	83	72	65	74	6.5	ne.	4	3	0.00
	30.13	30.07	30.12	72.3	78.7	74.7	80.4	70.7	66.1	69.3	6.6	....	4.1	4.5	1.59

Mean temperature: 6+2+9+3 is 75.2; the normal is 73.0; extreme temperatures, 83° and 66°.

TABLE V.—*Mean temperature for each hour of seventy-fifth meridian time, June, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak	60.0	58.8	57.4	56.5	55.7	54.7	55.6	58.4	61.2	65.3	67.8	70.3	72.2	74.1	75.4	76.4	77.0	76.9	75.6	74.1	70.7	67.2	64.5	62.0	66.2
Boston, Mass	61.7	61.0	60.1	59.6	59.3	60.0	61.9	63.9	65.7	66.8	68.2	69.8	70.7	71.4	71.1	71.2	71.1	70.1	68.7	66.5	65.5	64.5	63.6	62.8	65.6
Buffalo N. Y	62.6	61.9	60.8	60.3	60.2	60.9	63.0	64.5	66.0	66.9	68.4	69.7	70.2	70.9	71.1	71.8	71.4	70.8	70.2	68.6	67.1	66.2	65.3	64.2	66.4
Chicago, Ill	64.9	64.5	64.0	63.5	62.8	62.4	63.1	64.6	65.6	66.7	67.7	68.0	68.0	67.9	68.9	69.1	69.3	69.1	68.7	68.1	67.3	66.9	66.5	63.1	66.4
Cincinnati, Ohio	69.3	68.5	67.7	67.0	66.3	66.1	66.6	68.2	70.9	73.8	75.2	76.8	78.1	78.8	79.1	79.0	79.2	78.9	78.1	77.2	75.0	73.3	72.1	70.8	73.2
Cleveland, Ohio	64.0	63.4	62.2	61.5	61.0	61.3	63.0	65.7	68.1	69.7	69.8	70.1	70.8	71.5	71.3	71.6	71.5	71.2	70.8	70.0	69.0	67.9	66.3	65.3	67.4
Detroit, Mich	63.2	62.3	61.7	61.0	60.5	60.2	62.0	64.5	66.9	68.7	70.6	71.9	72.7	74.0	74.1	74.3	74.2	73.0	72.3	70.5	68.4	67.0	65.8	64.7	67.7
Dodge City, Kans	69.5	68.6	66.9	66.3	65.3	64.6	64.1	65.5	69.8	73.0	76.8	80.1	82.7	84.5	86.1	87.5	88.3	88.2	87.1	85.2	81.1	77.3	74.7	72.0	76.1
Eastport, Me	51.0	50.3	49.7	49.6	49.9	51.2	53.5	55.4	57.4	58.1	58.8	59.3	60.0	61.3	61.2	61.1	59.9	58.6	56.3	55.5	54.8	53.8	52.8	52.1	55.5
Galveston, Tex	80.7	80.5	80.4	79.9	79.7	79.4	79.2	79.9	80.7	81.6	82.9	83.7	83.9	84.3	84.5	84.3	84.2	83.8	83.5	82.7	32.2	81.6	81.3	81.0	81.9
Havre, Mont	59.5	57.7	55.9	54.6	53.0	51.9	51.1	53.2	57.3	60.6	64.7	67.8	70.6	72.6	74.3	75.2	75.9	76.4	75.5	74.9	72.7	69.4	64.7	61.8	64.6
Kansas City, Mo	69.2	68.5	67.3	66.7	65.9	65.1	65.4	66.5	68.7	70.9	72.7	74.8	76.4	77.8	78.3	79.1	79.7	79.3	78.4	76.9	75.0	73.1	71.9	70.8	73.8
Key West, Fla	80.2	80.2	80.2	80.2	80.0	80.2	81.2	82.5	83.4	83.8	84.4	84.8	84.9	84.6	84.5	84.4	84.1	83.4	82.6	81.7	81.3	81.0	80.9	80.5	82.3
Memphis, Tenn	72.9	71.9	71.4	70.9	70.2	69.8	70.6	72.2	74.5	76.5	78.8	80.4	81.8	82.7	83.0	82.5	82.7	82.5	81.6	80.2	77.4	76.0	74.8	73.7	76.6
New Orleans, La	75.8	75.4	75.2	74.9	74.8	74.6	74.9	76.2	78.0	79.9	81.0	82.0	81.9	83.2	83.2	83.4	82.9	82.6	81.5	80.4	79.1	78.1	77.3	76.6	78.9
New York, N. Y	63.0	62.5	61.8	61.6	61.2	61.5	62.3	63.6	65.5	66.8	67.5	68.6	69.6	70.0	70.6	70.4	69.8	68.7	67.5	67.2	65.8	65.2	64.5	63.8	65.8
Philadelphia, Pa	66.0	65.4	65.1	64.6	64.3	64.6	65.9	67.6	69.0	70.8	72.4	73.5	74.7	75.4	75.9	76.1	76.1	75.5	73.6	71.7	70.2	68.6	67.6	66.7	70.1
Pittsburg, Pa	65.8	65.0	64.3	63.6	63.1	63.0	64.3	66.4	69.3	71.4	73.5	75.1	76.0	76.6	76.3	76.6	76.3	75.6	73.7	72.4	70.9	69.5	68.3	67.0	70.2
Portland, Oreg	59.6	58.4	57.2	56.1	54.6	53.4	52.7	52.7	53.2	54.4	56.2	57.9	59.8	61.8	64.0	65.6	67.0	68.2	68.8	69.0	67.7	66.5	64.0	62.0	60.5
St. Louis, Mo	70.4	69.9	69.0	68.5	67.9	67.8	68.4	69.6	71.3	72.8	74.9	76.6	78.0	79.5	79.5	80.4	80.7	79.8	78.6	77.5	76.0	74.0	73.0	71.9	74.0
St. Paul, Minn	64.1	63.1	61.9	61.0	60.1	59.5	60.4	62.9	65.7	68.2	70.4	72.0	73.8	74.6	75.1	75.4	75.3	74.7	74.1	73.6	71.9	70.0	68.0	66.1	68.4
Salt Lake City, Utah	67.7	67.3	65.6	64.4	63.3	61.9	60.5	61.0	64.1	67.5	71.1	74.0	76.3	78.1	79.1	79.5	79.5	79.9	80.1	80.0	78.0	74.2	71.5	70.3	71.4
San Diego, Cal	62.4	62.0	61.9	61.8	61.8	61.7	61.5	61.3	61.6	62.3	64.0	65.8	66.5	67.2	67.4	67.2	67.4	67.5	67.0	66.8	65.7	64.7	63.4	62.8	64.2
San Francisco, Cal	53.1	52.8	52.7	52.2	52.1	51.7	51.7	51.8	52.5	54.1	56.4	58.3	60.1	60.5	61.1	61.1	60.9	60.5	59.6	58.9	57.3	55.9	54.1	53.8	56.0
Savannah, Ga	74.4	73.9	73.7	73.3	73.0	73.2	74.8	77.4	80.2	82.3	84.2	85.2	85.4	85.5	84.5	82.6	81.9	80.8	79.1	77.4	76.6	76.1	75.6	74.9	78.6
Washington, D. C	66.8	66.1	65.0	64.2	63.5	64.1	65.9	67.7	70.1	72.2	74.0	75.5	76.9	77.8	78.2	77.3	76.3	75.8	74.1	72.0	70.5	69.2	68.4	67.7	70.8

TABLE VI.—*Mean pressure for each hour of seventy-fifth meridian time, June, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak	28.188	.188	.191	.193	.192	.198	.206	.207	.210	.211	.207	.204	.200	.191	.180	.169	.159	.151	.148	.149	.153	.162	.174	.183	.184
Boston, Mass	29.819	.816	.815	.821	.833	.840	.845	.846	.841	.840	.834	.825	.816	.809	.803	.797	.797	.795	.804	.814	.824	.829	.832	.834	.822
Buffalo, N. Y	29.155	.151	.150	.157	.160	.167	.175	.178	.178	.179	.177	.174	.164	.155	.149	.141	.138	.138	.143	.146	.157	.162	.164	.163	.159
Chicago, Ill	29.107	.100	.096	.097	.102	.112	.122	.133	.135	.137	.139	.141	.133	.129	.120	.110	.105	.099	.098	.094	.099	.108	.112	.114	.114
Cincinnati, Ohio	29.325	.321	.322	.324	.333	.340	.352	.360	.360	.358	.358	.353	.338	.330	.313	.307	.299	.296	.303	.308	.323	.334	.339	.337	.331
Cleveland, Ohio	29.190	.189	.190	.195	.201	.208	.216	.221	.221	.219	.220	.219	.213	.199	.190	.178	.171	.174	.175	.182	.189	.195	.199	.197	.198
Detroit, Mich	29.206	.203	.208	.204	.209	.218	.224	.234	.237	.238	.238	.234	.222	.213	.203	.195	.185	.183	.186	.188	.196	.205	.209	.213	.210
Dodge City, Kans	27.403	.404	.408	.408	.403	.415	.420	.428	.440	.443	.439	.434	.423	.406	.388	.368	.353	.340	.334	.334	.348	.365	.383	.398	.395
Eastport, Me	29.820	.819	.818	.824	.834	.840	.845	.843	.839	.834	.830	.822	.814	.807	.804	.802	.805	.810	.816	.822	.830	.831	.832	.832	.824
Galveston, Tex	29.955	.951	.948	.945	.950	.958	.966	.977	.984	.984	.984	.985	.979	.970	.956	.941	.927	.918	.921	.926	.936	.948	.959	.962	.956
Havre, Mont	27.321	.320	.320	.323	.326	.329	.334	.342	.349	.353	.352	.345	.336	.326	.317	.308	.298	.291	.281	.276	.278	.290	.308	.316	.318
Kansas City, Mo	28.999	.998	.993	.992	.002	.011	.023	.029	.041	.040	.033	.035	.028	.018	.008	.998	.986	.978	.972	.975	.979	.989	.999	.003	.005
Key West, Fla	30.011	.000	.992	.991	.995	.001	.014	.025	.031	.033	.033	.028	.019	.010	.997	.986	.982	.987	.001	.014	.022	.028	.032	.025	.011
Memphis, Tenn	29.568	.563	.559	.561	.566	.575	.586	.597	.607	.610	.613	.611	.600	.586	.575	.563	.551	.550	.552	.560	.567	.576	.584	.583	.578
New Orleans, La	29.944	.938	.935	.937	.944	.952	.965	.971	.981	.979	.979	.975	.965	.953	.939	.929	.921	.914	.919	.920	.934	.947	.955	.956	.948
New York, N. Y	29.652	.648	.648	.648	.654	.661	.669	.672	.668	.668	.665	.660	.651	.643	.636	.630	.628	.633	.638	.643	.656	.663	.667	.667	.653
Philadelphia, Pa	29.864	.864	.864	.867	.874	.878	.884	.891	.890	.890	.885	.879	.868	.858	.849	.842	.836	.841	.851	.858	.870	.877	.879	.878	.868
Pittsburg, Pa	29.117	.116	.115	.114	.121	.128	.139	.144	.145	.142	.137	.132	.121	.112	.103	.097	.089	.089	.096	.101	.105	.112	.118	.121	.117
Portland, Oreg	29.902	.908	.911	.912	.913	.915	.919	.925	.929	.931	.932	.931	.926	.923	.914	.905	.895	.887	.876	.870	.870	.875	.885	.896	.906
St. Louis, Mo	29.389	.387	.386	.389	.395	.406	.417	.429	.433	.433	.431	.427	.419	.409	.398	.385	.377	.374	.375	.373	.380	.392	.399	.401	.400
St. Paul, Minn	29.077	.077	.078	.077	.082	.091	.097	.101	.102	.101	.098	.091	.084	.078	.069	.063	.057	.055	.050	.047	.053	.062	.065	.075	.076
Salt Lake City, Utah	25.635	.663	.628	.626	.627	.630	.641	.650	.659	.668	.670	.672	.668	.664	.652	.641	.632	.623	.613	.608	.608	.611	.626	.635	.638
San Diego, Cal	29.865	.866	.863	.856	.848	.844	.842	.845	.852	.862	.872	.874	.877	.878	.876	.872	.870	.864	.852	.843	.843	.847	.853	.863	.860
San Francisco, Cal	29.815	.813	.809	.805	.800	.798	.803	.811	.823	.835	.839	.839	.841	.843	.836	.829	.819	.811	.800	.792	.795	.799	.806	.818	.816
Savannah, Ga	29.928	.922	.917	.918	.924	.937	.947	.956	.960	.961	.958	.951	.938	.923	.910	.902	.896	.900	.907	.916	.925	.932	.939	.939	.929
Washington, D. C	29.878	.876	.877	.880	.888	.897	.905	.909	.912	.914	.911	.906	.891	.879	.869	.860	.858	.859	.864	.868	.877	.884	.890	.891	.885

TABLE VII.—*Average wind movement for each hour of seventy-fifth meridian time, June, 1896.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	9.1	9.0	8.6	8.3	7.9	7.7	7.7	8.2	9.6	11.4	11.6	11.1	10.1	9.7	9.8	10.4	10.7	11.2	11.2	11.1	9.5	8.5	8.8	9.2	9.6
Albany, N. Y	5.5	5.3	4.9	4.9	4.9	5.0	5.9	7.5	8.5	9.0	9.6	10.1	10.5	10.1	11.3	11.6	10.8	9.8	8.3	7.6	6.2	6.1	5.9	6.0	7.7
Alpena, Mich	5.0	5.3	5.3	5.4	5.6	5.5	6.1	6.5	7.4	8.5	9.8	10.3	11.2	12.0	11.3	11.2	10.7	10.6	9.2	7.2	5.5	5.3	5.1	4.9	7.7
Amarillo, Tex	17.2	19.5	17.7	16.2	16.0	15.2	15.2	15.1	17.6	18.9	18.6	17.1	16.5	15.8	16.0	16.5	18.1	18.1	19.5	20.6	21.8	20.0	18.2	17.2	17.6
Atlanta, Ga	8.3	8.3	8.4	8.0	8.2	7.3	7.5	7.8	8.3	8.8	9.2	8.8	10.4	10.5	10.2	10.4	9.7	8.9	8.0	7.2	7.3	7.8	7.7	8.1	8.5
Augusta, Ga	3.6	2.7	3.2	2.8	2.8	2.7	3.0	3.8	4.8	5.2	5.5	5.9	6.8	7.0	7.5	7.5	7.8	7.5	7.4	6.4	4.5	4.0	3.8	3.5	5.0
Baker City, Oreg	2.7	2.8	3.2	3.9	4.7	4.9	5.1	5.2	4.9	4.7	3.5	4.1	4.7	5.2	5.5	6.0	6.4	6.8	7.3	7.6	6.8	6.0	4.1	3.7	5.0
Baltimore, Md	5.6	5.8	5.4	5.3	5.1	5.0	5.7	6.7	6.9	7.1	7.9	8.4	9.4	9.6	10.0	9.5	9.2	8.7	7.2	5.7	5.5	4.9	5.3	5.3	6.9
Bismarck, N. Dak	7.0	7.3	6.9	6.1	6.8	6.8	6.6	8.4	9.9	10.6	12.3	13.1	13.5	13.7	13.7	13.5	13.9	13.8	13.1	11.6	11.2	9.8	8.8	8.1	10.3
Block Island, R. I	12.7	12.2	11.4	10.9	10.7	10.7	11.1	12.6	13.0	13.6	13.9	15.1	15.7	16.1	16.3	16.2	15.6	15.2	14.9	14.6	14.3	13.6	12.7	13.6	13.6
Boston, Mass	8.9	8.9	9.1	9.2	9.1	8.5	8.9	9.5	10.3	10.8	10.9	12.0	13.0	13.3	13.4	13.1	12.4	11.6	11.0	10.1	9.8	9.7	9.7	9.4	10.5
Buffalo, N. Y	10.7	10.4	10.3	10.1	10.1	10.3	9.9	9.5	10.5	11.3	11.8	11.9	12.9	12.9	13.6	13.9	13.9	13.6	12.6	10.5	10.4	10.4	10.3	10.2	11.3
Cairo, Ill	6.7	6.0	6.1	5.8	6.3	5.7	6.0	6.6	7.5	7.6	7.9	8.0	9.1	8.5	8.5	8.9	8.5	7.9	7.8	6.1	5.5	5.5	5.0	5.7	7.0
Cape Henry, Va	9.4	8.8	9.5	9.0	10.4	10.1	11.0	11.5	11.6	12.3	12.5	12.0	11.8	11.7	12.1	11.4	11.8	11.3	10.0	9.3	9.0	8.8	9.5	9.3	10.6
Charleston, S. C	6.0	6.1	6.1	5.1	5.3	5.9	6.6	7.2	7.0	7.2	8.0	8.5	9.5	10.6	10.7	11.4	11.4	10.6	9.9	8.3	7.1	7.4	6.8	6.5	7.9
Charlotte, N. C	4.6	4.6	4.4	4.3	4.6	4.5	4.6	6.1	6.2	6.8	6.6	6.6	6.4	6.5	6.9	6.6	7.0	7.0	5.9	5.4	5.0	5.0	5.4	4.8	5.7
Chattanooga, Tenn	4.0	4.2	4.1	3.9	3.6	3.8	3.7	4.5	5.7	6.3	6.5	7.5	8.3	8.4	8.8	8.8	9.1	8.6	8.4	7.2	5.4	4.0	4.1	4.3	6.0
Cheyenne, Wyo	7.8	8.3	7.0	6.5	6.7	6.3	6.6	6.7	8.4	9.4	10.4	10.9	11.4	12.3	13.3	13.0	12.9	11.2	11.3	11.4	10.4	9.4	8.1	7.6	9.5
Chicago, Ill	14.3	13.3	13.4	13.0	12.8	13.4	14.2	14.6	14.0	14.2	14.8	14.9	15.9	16.5	16.0	15.8	15.0	14.4	14.4	13.8	13.6	12.8	13.0	12.8	14.2
Cincinnati, Ohio	4.3	4.5	4.7	4.3	4.5	4.2	4.4	4.8	5.8	7.1	8.0	8.2	9.0	9.6	9.9	10.2	10.0	8.9	8.7	6.7	5.2	4.7	5.0	4.5	6.6
Cleveland, Ohio	7.3	7.6	8.0	8.1	7.9	8.3	8.9	10.4	10.0	11.0	11.4	11.5	11.9	11.9	12.3	11.8	11.4	11.6	10.5	8.7	7.9	7.2	7.5	7.1	9.6
Columbia, Mo	5.4	5.6	5.7	5.6	5.0	5.7	5.6	5.9	6.1	7.0	7.3	7.0	7.3	7.0	7.2	7.2	7.3	7.2	6.8	5.9	5.7	6.0	5.9	5.3	6.3
Columbus, Ohio	4.1	4.3	4.0	3.8	3.8	3.6	3.8	4.4	5.3	6.0	6.5	7.1	7.1	8.3	7.7	7.2	7.4	7.8	6.9	5.6	5.0	4.9	4.5	4.1	5.5
Concordia, Kans	5.3	4.9	5.1	4.6	3.9	3.5	3.9	4.7	5.3	6.6	7.5	8.0	8.5	8.8	9.1	9.4	9.5	9.1	8.2	7.0	5.3	5.3	5.5	5.7	6.4
Corpus Christi, Tex	12.4	10.3	9.3	8.5	7.1	7.0	6.1	5.8	7.5	8.9	9.5	11.3	13.0	15.0	15.7	17.4	17.9	18.4	17.7	16.9	16.6	15.4	14.3	13.1	12.3
Davenport, Iowa	6.5	5.9	5.9	6.1	6.4	6.8	6.9	6.7	6.9	7.4	8.3	9.3	10.5	10.4	10.8	10.3	10.4	10.0	9.6	8.1	6.5	6.5	6.1	6.2	7.9
Denver, Colo	6.1	6.7	7.7	6.9	5.8	5.0	4.1	4.8	4.0	4.6	5.1	6.1	7.1	7.6	9.7	10.5	10.9	11.8	10.8	10.7	9.3	8.2	7.1	5.5	7.3
Des Moines, Iowa	5.4	4.8	4.4	4.1	4.6	3.7	4.2	4.7	6.0	7.1	7.7	7.9	8.5	9.0	9.2	9.4	9.4	9.4	8.4	7.2	5.7	4.9	5.6	5.8	6.6
Detroit, Mich	6.7	6.9	7.2	7.2	6.5	6.3	6.1	6.2	7.1	7.8	8.8	9.1	9.4	9.9	9.7	9.9	9.9	9.0	8.3	6.6	6.5	7.2	8.0	7.4	7.8
Dodge City, Kans	13.0	11.8	10.4	9.9	10.3	10.0	9.1	9.4	12.3	14.2	13.7	13.0	12.7	13.0	13.5	13.3	14.0	14.7	14.4	15.1	15.3	13.2	13.0	12.5	12.6
Dubuque, Iowa	3.1	3.1	3.0	3.0	3.1	2.9	3.1	3.7	4.3	4.9	5.5	6.4	6.5	6.5	6.7	6.7	6.8	6.4	5.1	4.8	3.8	3.2	3.3	3.0	4.5
Duluth, Minn	8.2	8.6	8.9	9.2	8.6	8.1	8.1	8.1	9.1	9.9	10.7	11.3	10.9	10.7	10.4	10.9	10.8	10.5	8.8	8.1	6.9	6.8	7.3	7.5	9.1
Eastport, Me	6.4	5.7	6.7	6.9	6.7	7.1	7.5	8.3	8.9	9.6	10.1	10.6	10.5	10.4	10.7	10.7	10.3	9.1	7.9	7.2	7.4	7.2	7.6	6.9	8.3
El Paso, Tex	11.2	13.1	13.0	12.6	11.2	10.6	10.1	10.1	10.3	10.5	10.3	10.0	9.7	9.7	9.5	10.5	11.5	12.0	12.3	13.0	13.2	11.6	10.5	11.2	11.2
Erie, Pa	7.3	7.7	8.2	8.5	8.2	8.0	8.3	8.1	8.4	8.9	8.6	8.7	9.5	9.2	9.3	9.2	9.4	8.5	7.2	6.7	6.3	6.2	6.9	6.7	8.1
Eureka, Cal	7.5	5.9	4.8	4.3	3.8	3.7	3.9	4.0	3.5	4.3	5.7	7.0	8.4	9.9	12.6	13.4	13.6	14.1	13.8	13.5	12.9	10.6	9.3	8.1	8.3
Fort Canby, Wash	9.1	9.1	9.0	8.8	8.9	9.3	9.0	9.6	9.9	8.9	9.3	9.0	9.8	11.0	11.7	11.7	12.7	12.8	12.2	12.3	11.6	10.8	9.9	9.4	10.2
Fort Smith, Ark	4.6	4.4	4.6	4.5	4.5	4.1	4.5	4.7	5.2	5.8	6.3	6.3	7.0	6.8	7.0	7.2	7.2	7.4	7.2	6.6	5.0	4.4	4.5	4.1	5.6
Fresno, Cal	10.8	11.1	10.5	9.6	8.3	7.4	6.4	5.7	5.6	5.8	5.1	5.1	5.1	5.4	5.1	5.7	5.9	6.5	6.9	7.8	8.6	9.5	9.2	9.8	7.4
Galveston, Tex	9.4	8.9	10.0	9.8	9.6	8.7	8.4	8.4	9.3	9.6	9.6	9.6	10.7	11.2	11.5	12.3	12.7	12.6	12.1	11.2	10.9	10.6	9.6	9.2	10.2
Grand Haven, Mich	5.8	5.7	5.9	5.9	5.9	5.8	6.0	7.1	7.9	8.6	9.0	9.1	10.8	11.4	11.4	11.4	10.7	8.7	7.3	5.7	4.7	5.3	6.1	3.0	7.6
Greenbay, Wis	5.7	5.1	5.1	5.0	4.6	4.7	4.9	5.4	6.3	6.8	6.9	7.2	8.1	9.0	8.8	8.7	9.0	8.7	7.9	7.0	6.7	5.8	5.6	6.1	6.6
Hannibal, Mo	6.2	6.1	6.6	6.0	5.9	6.0	6.5	6.2	7.1	7.8	8.5	9.2	9.0	9.5	8.9	9.1	9.3	8.9	8.1	6.8	5.6	5.8	6.0	5.8	7.3
Harrisburg, Pa	4.2	4.1	4.8	4.0	4.2	4.0	4.3	4.9	5.6	6.1	6.4	6.6	7.0	7.9	7.1	7.3	6.6	6.4	6.0	5.2	4.8	4.3	4.3	4.0	5.4
Hatteras, N. C	9.2	9.1	9.1	9.0	9.4	9.5	10.2	10.6	11.4	11.3	11.7	12.0	12.7	13.3	13.2	13.1	12.7	11.6	11.9	11.0	9.9	9.2	9.2	8.6	10.8
Havre, Mont	5.2	5.6	5.0	5.3	5.9	5.8	5.4	5.2	6.2	6.5	6.7	6.2	7.2	7.3	7.6	7.7	7.5	7.5	8.2	7.9	7.5	5.7	6.4	5.6	6.5
Helena, Mont	9.3	8.9	8.8	7.9	8.2	6.6	6.1	6.0	5.1	5.4	5.8	6.3	7.4	7.5	7.8	9.1	9.8	9.5	9.3	10.2	10.4	9.8	8.3	8.4	8.0
Huron, S. Dak	10.7	10.9	10.7	10.9	11.5	10.7	10.1	9.8	10.2	11.8	12.7	14.0	14.1	15.5	15.6	15.5	15.7	14.7	14.1	12.7	10.9	11.2	11.6	11.0	12.4
Idaho Falls, Idaho	6.7	6.7	6.0	5.6	6.6	6.5	6.5	6.3	5.5	6.0	6.3	6.6	7.5	7.8	8.5	9.2	10.4	10.6	11.4	11.6	11.6	10.4	8.7	7.5	7.9
Indianapolis, Ind	3.2	3.4	3.5	3.3	3.0	3.2	3.6	4.3	5.2	5.7	6.2	6.3	6.5	7.3	7.0	7.2	7.5	6.6	6.2	4.8	3.7	3.6	3.7	3.3	4.9
Jacksonville, Fla	6.1	6.1	5.7	5.8	5.3	5.7	5.3	6.0	6.6	6.8	6.8	7.4	7.6	8.1	9.3	10.0	10.0	10.6	8.9	8.2	7.0	5.8	5.9	5.6	7.1
Jupiter, Fla	9.7	9.8	9.2	9.6	8.7	8.2	7.6	8.3	9.5	10.0	11.0	11.4	11.5	12.6	12.0	12.1	11.5	9.7	8.7	8.9	8.7	8.8	8.8	9.9	9.8
Kansas City, Mo	5.0	4.8	5.4	5.5	5.2	4.7	4.8	5.0	5.7	7.0	7.7	7.6	8.4	8.0	8.1	8.3	8.4	8.3	8.5	7.6	5.7	4.9	5.4	5.1	6.5
Keokuk, Iowa	5.5	5.5	5.1	4.7	4.8	4.7	4.7	5.0	5.5	5.7	6.9	7.6	7.7	8.2	8.4	8.6	8.6	8.3	7.8	6.4	5.5	5.3	5.1	5.5	6.3
Key West, Fla	7.6	7.8	8.1	7.6	7.9	7.7	7.9	8.9	9.3	9.4	9.8	9.6	9.3	9.3	9.2	9.0	9.2	9.3	8.9	8.4	8.1	8.0	8.3	8.2	8.6
Kittyhawk, N. C	10.2	10.3	10.2	10.4	11.3	11.7	12.3	12.8	12.7	12.4	12.8	12.3	13.3	13.7	14.4	15.3	15.7	15.1	14.9	13.4	11.4	11.1	11.2	10.9	12.5
Knoxville, Tenn	3.0	2.8	2.3	2.5	2.2	2.6	2.8	4.0	5.2	5.6	6.0	6.0	6.6	6.8	7.4	7.4	6.6	5.9	5.2	4.1	3.2	3.4	3.3	3.3	4.5
La Crosse, Wis	5.0	4.9	3.9	3.9	3.7	3.3	4.1	4.8	5.3	5.7	6.3	6.8	7.9	8.0	8.0	7.9	7.8	7.1	7.3	6.5	5.1	5.0	5.4	5.2	5.8
Lander, Wyo	3.6	3.2	3.1	3.6	3.2	2.8	2.3	2.0	1.9	2.5	3.2	3.2	3.9	4.5	5.6	6.7	7.6	7.7	8.5	8.2	6.3	4.9	5.5	5.0	4.5
Lexington, Ky	8.2	7.9	8.5	8.1	7.9	7.8	7.6	7.6	9.0	9.5	9.5	8.9	10.2	9.7	11.2	11.5	11.4	9.5	9.4	7.3	7.4	7.4	8.2	8.1	8.8
Little Rock, Ark	3.5	3.5	3.8	4.3	4.3	4.0	4.6	5.5	6.6	7.0	7.8	7.9	8.2	8.9	9.2	9.2	8.8	9.5	9.5	8.3	5.9	5.3	4.3	3.5	6.4
Los Angeles, Cal	1.7	1.7	1.3	1.1	1.5	1.4	1.5	1.6	1.9	2.0	1.9	2.6	3.2	4.0	5.0	6.5	7.4	7.2	7.2	6.3	5.4	4.6	3.3	2.3	3.4
Louisville, Ky	5.3	4.9	4.7	5.3	4.8	4.6	4.7	5.8	6.6	7.2	8.2	8.6	9.0	9.3	9.4	9.6	9.5	8.3	8.1	6.5	5.5	5.1	5.2	5.0	6.7
Lynchburg, Va	2.2	2.0	1.5	1.6	1.4	1.6	2.1	3.1	4.1	4.7	4.9	4.6	5.0	4.8	5.6	5.2	4.4	4.4	3.7	3.1	1.9	1.9	1.9	1.8	3.2
Marquette, Mich	7.2	7.3	7.2	6.6	6.8	7.3	6.8	6.9	7.2	8.5	9.4	9.7	9.8	10.4	10.3	9.2	8.7	8.7	7.3	6.7	5.4	5.6	5.7	6.4	7.7
Memphis, Tenn	7.5	7.2	7.5	7.2	7.1	7.0	6.9	6.9	8.3	8.7	8.0	8.5	8.4	8.9	9.6	10.2	9.4	8.9	8.7	7.9	7.0	7.1	6.6	6.9	7.9
Meridian, Miss	3.9	3.8	3.8	2.9	3.0	2.9	3.2	4.5	5.3	5.4	5.9	6.8	7.8	7.9	7.9	7.3	7.0	6.7	5.9	4.5	3.8	4.2	4.2	3.6	5.1
Miles City, Mont	5.9	6.2	5.8	5.5	5.0	4.8	4.6	4.4	5.7	7.0	8.1	8.7	10.1	10.7	10.0	9.6	9.5	9.2	10.0	9.7	9.2	7.8	6.9	6.4	7.5
Milwaukee, Wis	6.8	7.0	7.1	6.9	6.6	6.9	7.0	7.3	8.3	8.5	8.2	8.5	9.3	9.7	9.6	9.2	9.2	8.2	7.6	6.6	6.2	6.3	6.5	6.8	7.7
Minneapolis, Minn	8.5	8.2	8.7	8.9	8.3	8.4	8.5	7.9	8.9	10.5	11.6	12.0	13.5	13.4	14.2	13.5	12.7	12.9	12.4	11.0	9.3	9.6	9.5	9.2	10.5
Mobile, Ala	5.7	5.5	5.3	5.0	5.1	4.6	4.6	5.7	6.7	7.0	7.1	7.5	8.6	9.4	9.5	11.1	10.2	10.0	9.0	7.7	6.2	6.1	5.7	5.7	7.0
Montgomery, Ala	4.2	4.0	4.0	4.4	4.0	3.8	4.0	4.7	5.3	6.1	6.6	7.0	7.6	8.0	8.0	7.9	7.8	7.2	5.8	5.3	4.3	4.2	4.2	4.2	5.5
Moorhead, Minn	8.0	7.9	8.0	7.8	8.6	8.5	8.7	8.8	9.7	10.5	10.5	10.6	11.9	12.4	12.8	13.4	12.8	12.6	11.5	10.7	8.3	7.6	7.8	7.9	9.9
Nantucket, Mass	8.5	8.9	8.8	8.8	9.0	9.4	10.2	10.6	10.8	10.8	11.1	11.4	11.1	11.8	11.0	10.8	10.6	10.1	9.3	8.9	8.8	8.5	8.6	8.7	9.8
Nashville, Tenn	3.4	3.6	3.7	3.4	3.2	3.8	3.6	5.0	6.1	7.1	7.8	8.1	8.9	8.7	7.9	8.6	8.4	7.6	7.9	6.1	4.9	4.4	4.6	4.2	5.9
New Haven, Conn	5.0	5.4	4.8	5.2	5.5	5.1	5.6	6.4	7.5	8.1	9.2	9.8	11.1	11.9	11.9	11.9	11.3	9.6	8.3	6.9	6.4	6.0	5.6	5.4	7.7
New Orleans, La	6.3	5.8	5.5	5.0	4.8	5.2	5.0	5.4	7.5	8.3	8.8	8.4	8.7	8.7	9.6	8.7	8.3	9.1	8.7	7.8	7.0	6.5	6.3	5.7	7.1
New York, N. Y	10.2	10.2	10.1	9.6	8.7	8.3	9.0	8.9	9.1	9.3	10.6	11.5	12.2	12.9	12.9	13.4	13.8	13.1	12.2	11.1	11.4	11.4	10.4	10.1	10.8
Norfolk, Va	5.8	5.7	5.6	5.4	5.8	5.7	6.5	7.8	8.1	7.7	8.4	8.2	8.7	9.2	9.5	9.9	8.7	8.7	7.6	6.6	6.0	6.0	5.7	5.6	7.2
Northfield, Vt	6.5	6.3	5.3	6.0	5.7	5.1	6.0	8.3	9.8	11.1	11.9	11.9	12.4	12.2	12.8	12.5	12.3	10.6	8.6	7.4	7.4	7.7	7.3	7.3	8.8
North Platte, Nebr	8.3	7.3	7.1	6.6	5.5	5.6	4.9	5.6	7.1	8.8	9.3	9.7	10.7	11.7	12.6	12.6	13.2	13.1	12.7	11.5	10.7	10.2	10.3	9.7	9.4
Oklahoma, Okla	8.4	7.6	7.4	8.0	8.1	7.4	6.7	7.7	9.2	10.1	10.8	10.5	10.4	10.8	9.9	9.7	10.1	9.9	9.4	8.7	7.2	7.2	7.9	8.2	8.8
Omaha, Nebr	5.7	6.2	5.5	5.4	5.5	5.6	4.8	5.2	6.1	7.3	8.2	8.7	9.5	9.6	9.9	9.9	9.6	9.5	8.8	8.3	6.9	6.4	6.5	5.9	7.3
Oswego, N. Y	7.7	7.5	7.5	7.5	8.0	8.2	8.4	8.7	9.3	9.0	9.4	9.7	10.0	9.9	9.3	8.6	8.4	7.4	6.7	6.7	7.6	8.0	8.2	8.0	8.3
Palestine, Tex	5.0	5.2	5.2	4.9	5.0	4.3	4.5	5.4	6.8	7.4	7.3	7.2	7.1	7.2	7.2	6.5	7.0	6.8	7.0	5.9	4.8	4.5	4.4	5.1	5.9

TABLE VII.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Parkersburg, W. Va.	2.7	2.2	2.0	1.8	1.6	1.7	2.1	2.9	3.6	4.4	4.8	5.4	5.6	6.1	6.2	6.5	6.4	5.6	4.1	3.0	2.5	2.5	1.8	2.2	3.7
Pensacola, Fla.	8.7	8.5	8.4	8.2	8.0	8.0	8.1	8.6	8.9	8.5	8.6	9.0	9.4	11.0	10.8	11.8	12.4	11.6	11.6	9.0	8.4	7.7	7.2	7.5	9.2
Philadelphia, Pa.	7.5	7.5	7.1	6.7	6.8	7.3	7.5	8.9	8.6	9.6	10.0	10.2	10.3	11.0	11.0	11.1	10.8	10.2	9.4	9.2	8.5	8.3	8.0	7.6	8.9
Phœnix, Ariz.	3.9	3.6	3.5	3.8	4.1	4.0	4.6	5.6	5.4	5.4	4.8	5.5	5.0	5.1	5.3	5.5	6.1	6.8	7.4	7.1	5.3	4.6	4.3	4.6	5.1
Pierre, S. Dak.	10.6	10.0	8.3	7.8	7.3	7.3	7.4	7.7	8.9	9.6	11.3	11.4	12.0	13.4	13.8	13.7	14.0	13.7	13.9	13.0	11.7	11.1	10.8	10.8	10.8
Pittsburg, Pa.	3.1	2.6	2.8	3.0	2.9	3.1	3.5	4.2	4.9	5.7	6.1	6.7	6.9	7.4	8.0	7.8	7.7	6.3	6.3	4.7	4.2	3.4	3.3	3.1	4.9
Port Angeles, Wash.	6.0	6.4	6.5	6.4	5.9	5.8	5.3	5.1	3.8	3.2	5.3	6.6	7.6	7.5	8.3	8.3	9.1	9.8	10.4	11.9	11.4	9.9	7.7	6.7	7.3
Port Huron, Mich.	7.6	7.2	7.2	7.1	6.7	6.6	6.8	7.8	8.1	9.5	9.6	10.0	10.7	10.7	10.6	10.7	10.0	9.7	7.7	6.6	6.6	7.3	7.2	7.0	8.3
Portland, Me.	5.3	5.4	5.3	5.2	5.5	5.3	5.7	6.8	7.6	8.2	9.2	9.8	10.6	10.7	10.2	10.3	10.0	8.6	7.5	6.8	6.9	6.2	6.2	5.8	7.5
Portland, Oreg.	8.1	8.2	7.0	5.8	6.0	5.6	6.6	6.6	6.5	6.8	8.1	8.3	8.7	8.1	8.3	8.7	9.0	8.6	9.0	9.1	9.4	9.0	8.1	8.6	7.8
Pueblo, Colo.	7.7	6.8	5.1	4.9	5.4	6.2	6.1	5.2	4.8	4.9	5.9	5.9	7.1	8.3	10.1	10.5	12.1	12.2	12.7	12.5	10.6	10.8	10.2	8.6	8.1
Raleigh, N. C.	3.8	4.4	4.1	4.2	4.2	4.0	4.6	5.8	6.0	5.8	5.8	5.9	6.0	6.0	6.4	6.2	6.2	5.9	5.0	3.8	3.5	4.2	3.9	4.1	5.0
Rapid City, S. Dak.	8.5	7.9	7.5	7.7	8.3	8.1	8.5	9.2	9.4	9.9	11.3	12.6	14.6	15.1	14.3	13.7	13.8	13.8	13.9	12.5	10.8	8.7	7.8	7.9	10.6
Redbluff, Cal.	7.6	7.7	6.9	6.6	6.3	6.6	6.2	5.8	6.1	6.9	7.9	8.1	8.2	7.7	7.5	7.8	7.9	8.3	8.1	8.1	8.2	8.3	7.3	7.9	7.4
Rochester, N. Y.	5.2	5.8	5.5	5.7	5.9	5.7	6.2	6.9	7.1	7.5	8.1	8.4	9.1	9.3	9.8	9.2	8.7	8.5	7.5	6.4	5.5	5.2	5.2	5.1	7.0
Roseburg, Oreg.	3.3	2.5	2.2	1.5	1.7	1.8	1.7	1.6	2.0	2.4	3.6	4.5	4.4	5.0	5.6	6.2	6.5	7.7	8.2	9.1	9.1	8.8	6.6	4.5	4.6
Sacramento, Cal.	9.9	9.0	9.1	9.4	9.8	9.3	9.3	8.9	8.6	8.4	8.3	8.7	9.0	9.0	9.4	9.3	9.4	9.8	10.4	11.6	11.9	11.2	10.6	10.1	9.6
St. Louis, Mo.	6.9	7.2	7.0	6.8	6.6	6.9	7.3	7.8	8.5	8.6	8.9	9.2	9.5	9.8	9.5	9.9	9.9	9.7	9.3	7.9	7.6	7.4	7.1	6.9	8.2
St. Paul, Minn.	3.7	3.8	3.8	3.8	4.2	4.0	4.5	4.9	5.8	6.9	8.2	8.8	9.3	10.1	10.4	10.0	9.4	8.9	7.9	7.0	5.3	5.0	4.7	4.7	6.5
Salt Lake City, Utah.	5.3	5.5	5.3	4.9	4.4	4.6	4.5	4.1	3.8	4.1	4.8	5.9	6.8	7.9	8.7	9.5	9.6	9.4	7.8	6.6	6.5	6.9	6.3	5.4	6.2
San Antonio, Tex.	9.4	7.4	6.3	5.2	4.7	5.0	5.2	5.1	6.2	7.7	6.9	7.3	7.2	7.7	7.8	8.0	8.5	8.8	9.7	9.8	9.6	12.3	12.5	11.1	7.9
San Diego, Cal.	2.7	2.5	2.2	2.2	2.2	2.5	3.0	2.6	2.5	3.1	4.0	5.7	7.6	8.9	9.9	10.2	9.8	9.3	8.8	8.1	6.8	5.1	4.5	3.4	5.3
Sandusky, Ohio	5.9	5.6	5.4	5.4	6.7	7.0	7.1	6.4	6.8	6.8	7.5	7.8	8.3	8.4	8.2	9.2	8.8	8.4	7.8	6.9	6.4	6.4	6.4	6.0	7.1
San Francisco, Cal.	12.9	12.2	11.4	10.5	9.9	9.0	8.0	7.5	6.9	7.3	8.1	8.5	10.3	13.7	16.8	19.2	22.8	23.5	24.0	23.9	23.0	20.7	18.2	14.6	14.3
San Luis Obispo, Cal.	2.9	3.0	2.6	2.7	2.3	2.7	2.8	3.2	3.1	3.8	4.1	4.7	5.1	6.5	7.4	7.9	8.0	8.3	7.5	7.4	7.1	5.8	4.6	3.7	4.9
Santa Fe, N. Mex.	7.7	6.9	6.1	5.6	5.4	4.6	4.3	3.9	3.7	4.4	6.2	7.3	8.2	9.4	10.0	10.1	10.8	9.8	9.9	10.1	9.6	7.9	7.9	8.2	7.4
Sault Ste Marie, Mich.	4.9	4.8	5.2	5.5	5.0	4.4	4.1	5.4	6.6	7.8	8.4	10.0	11.1	10.9	11.5	11.5	11.2	10.5	9.6	7.7	6.7	5.2	5.3	5.2	7.4
Savannah, Ga.	5.3	4.7	4.7	4.8	5.0	4.9	5.1	5.8	6.3	6.4	6.7	6.5	7.2	8.1	9.0	9.4	8.6	9.1	8.8	7.4	6.3	5.9	5.1	4.9	6.5
Seattle, Wash.	4.3	4.1	4.1	4.2	4.1	4.0	3.7	3.3	3.8	4.0	4.4	4.9	5.6	6.2	6.8	6.4	6.3	6.3	6.7	7.1	7.2	7.0	6.4	5.5	5.3
Shreveport, La.	5.9	5.4	4.8	4.4	4.3	4.1	4.2	4.8	5.4	6.3	6.0	6.2	6.3	7.1	6.6	7.1	6.9	7.6	7.4	6.1	5.0	5.2	5.9	5.7	5.8
Sioux City, Iowa	6.6	7.6	7.3	7.0	6.8	7.1	6.7	7.4	8.5	10.0	11.8	13.1	13.0	13.6	12.9	13.0	13.5	12.4	11.0	10.5	8.2	7.5	7.0	7.1	9.6
Spokane, Wash.	4.6	3.8	3.4	3.6	3.8	3.6	3.8	3.6	4.9	5.6	7.1	7.4	8.0	7.6	7.9	8.4	8.4	8.5	8.3	8.4	7.8	7.4	5.8	5.8	6.1
Springfield, Ill.	6.4	6.6	6.3	6.1	6.3	6.4	6.0	6.7	7.4	8.1	8.4	8.9	8.8	9.2	9.3	9.0	9.2	9.3	7.7	6.1	5.5	5.7	5.4	5.6	7.3
Springfield, Mo.	7.3	7.4	7.1	7.4	7.5	7.0	7.1	7.1	7.5	8.1	7.3	7.8	8.6	8.5	8.7	8.3	8.4	7.8	7.5	7.1	6.5	7.5	7.3	8.1	7.6
Tampa, Fla.	4.6	4.4	4.0	4.7	4.5	4.6	5.3	5.5	6.4	7.0	6.7	6.6	8.1	8.0	7.7	8.1	8.3	6.8	7.1	5.2	5.3	5.5	4.8	4.5	6.0
Tatoosh Island, Wash.	7.6	7.6	7.9	7.7	7.6	7.0	7.2	7.5	7.9	8.4	8.5	8.3	8.6	9.8	9.8	9.2	9.6	9.7	9.2	9.0	7.9	8.2	8.2	7.9	8.3
Toledo, Ohio	6.1	5.7	6.2	6.4	7.3	7.0	7.3	7.5	8.1	8.3	9.5	10.1	10.4	10.7	10.1	10.2	10.3	10.2	9.1	7.2	6.8	6.7	6.4	6.4	8.1
Vicksburg, Miss.	6.0	6.2	6.3	6.3	6.0	5.6	5.3	5.6	6.1	6.0	6.2	6.3	6.3	6.5	6.8	7.4	7.1	6.9	6.6	5.4	5.3	5.9	6.1	6.2	6.2
Vineyard Haven, Mass	6.7	6.0	6.4	6.4	6.0	6.3	6.5	7.2	7.5	8.3	8.9	9.1	9.2	9.3	9.7	9.5	8.7	8.4	7.6	7.2	7.1	7.1	6.9	6.6	7.6
Walla Walla, Wash.	5.2	5.7	6.2	5.8	5.5	5.1	5.0	5.1	5.2	5.9	6.3	7.1	6.6	6.7	6.7	6.7	6.5	6.6	6.4	6.8	6.1	5.2	4.7	5.5	5.9
Washington, D. C.	3.9	4.0	4.3	3.9	3.8	3.7	4.6	5.3	6.1	6.5	6.3	6.8	7.4	6.9	7.1	7.1	7.4	5.7	5.5	4.5	3.6	3.4	3.5	4.0	5.2
Wichita, Kans.	5.8	5.6	5.2	5.2	5.0	4.7	5.4	5.4	6.4	7.4	7.9	8.8	8.8	9.0	8.8	9.0	9.0	8.7	8.0	7.1	5.9	5.6	5.5	5.7	6.8
Williston, N. Dak.	6.4	6.6	7.1	6.8	6.9	6.7	6.6	6.7	7.8	9.1	9.4	10.1	11.3	11.9	11.5	13.1	12.5	11.9	11.3	10.8	9.4	8.1	7.0	6.8	9.0
Wilmington, N. C.	5.7	5.9	5.5	5.3	4.8	5.2	5.5	6.5	7.2	7.1	7.9	7.8	9.7	10.4	10.4	10.8	10.6	10.0	8.3	7.4	6.5	5.6	5.4	5.5	7.3
Winnemucca, Nev.	8.5	8.3	8.9	9.2	9.1	8.5	8.0	7.9	7.5	8.5	9.8	10.6	10.3	12.2	11.7	12.4	13.1	12.6	12.7	12.9	12.0	9.8	7.3	7.8	10.0
Woods Hole, Mass.	12.9	12.1	11.6	11.5	11.5	10.9	11.5	11.2	11.4	12.0	12.8	14.0	14.9	15.0	15.1	16.0	15.1	13.6	12.8	12.5	11.7	13.0	12.7	13.4	12.9
Yuma, Ariz.	6.2	5.5	4.6	4.3	4.4	3.3	3.0	3.2	2.8	3.1	5.1	6.5	7.4	8.5	8.2	8.0	9.0	9.2	9.9	10.2	10.1	10.5	9.1	7.6	6.7

TABLE VIII.—*Heights of rivers above low-water mark, June, 1896.*

Stations.	Distance to mouth of river.	Danger-point on gauge.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Me'n stage.	Monthly range.
Mississippi River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
St. Paul, Minn	2,057	14.0	9.1	1	6.0	30	7.6	3.1
La Crosse, Wis	1,867	10.0	8.9	1	6.4	30	7.7	2.5
Dubuque, Iowa	1,759	15.0	12.8	1	7.2	30	9.1	5.6
Davenport, Iowa	1,653	15.0	11.7	1	6.1	30	7.9	5.6
Keokuk, Iowa	1,523	14.0	11.9	3,4	6.0	28-30	8.4	5.9
Hannibal, Mo.	1,462	17.0	13.3	3,4	6.8	28-30	9.7	6.5
St. Louis, Mo.	1,321	30.0	25.0	6	17.0	26	20.7	8.0
Memphis, Tenn	910	33.0	24.3	3,4	13.0	29,30	18.7	11.3
Helena, Ark	834	37.0	32.4	5,6	19.7	30	26.8	12.7
Arkansas City, Ark.	702	42.0	35.8	8,6	20.9	30	30.1	14.9
Greenville, Miss	662	40.0	30.5	8,9	17.3	30	25.6	13.2
Vicksburg, Miss	541	41.0	33.4	9,10	19.8	30	29.0	13.6
New Orleans, La	108	13.0	11.7	12-14	7.2	30	10.4	4.5
Missouri River.								
Pierre, S. Dak	1,132	13.0	9.0	26	3.4	4,5	6.8	5.6
Sioux City, Iowa	802	18.7	14.2	14	8.5	3	11.7	5.7
Omaha, Nebr	667	18.0	14.3	16	9.4	1,4	11.9	4.9
Kansas City, Mo.	386	21.0	18.8	17	13.6	1	16.2	5.2
Ohio River.								
Parkersburg, W. Va.	786	38.0	14.2	25	6.1	8	8.1	8.1
Catlettsburg, Ky	652	50.0	21.6	29	5.8	7	9.7	15.8
Cincinnati, Ohio	500	45.0	22.8	30	8.9	4	11.7	13.9
Louisville, Ky.	368	24.0	9.0	30	5.2	5	6.0	3.8
Evansville, Ind.	184	30.0	10.6	5	7.0	13	8.6	3.6
Paducah, Ky	47	40.0	18.8	2	7.6	26	12.3	11.2
Cairo, Ill.	1,140*	40.0	32.6	1,2	19.9	26,27	25.5	12.7
Monongahela River.								
Pittsburg, Pa	966†	22.0	9.0	26	4.2	30	6.1	4.8
Great Kanawha River.								
Charleston, W. Va.	61	30.0	9.3	27	4.4	9	5.6	4.9
Big Sandy River.								
Louisa, Ky	26	....	18.0	29	2.9	2, 3, 22, 23	5.4	15.1
Wabash River.								
Mount Carmel, Ill.	50	15.0	7.0	27	2.9	23	4.3	4.1
Cumberland River.								
Burnside, Ky.	404	50.0	12.6	3	1.3	23	3.6	11.3
Nashville, Tenn	145	40.0	12.9	6	2.8	24,28	6.2	10.1
Tennessee River.								
Knoxville, Tenn.	640	29.0	....	....	....	....	....	....
Chattanooga, Tenn.	455	33.0	7.2	11	2.6	1, 27, 28	3.8	4.6
Johnsonville, Tenn.	94	21.0	5.7	16	2.7	6, 24	3.8	3.0
Arkansas River.								
Fort Smith, Ark	351	22.0	16.0	3	3.6	25	7.2	12.4
Little Rock, Ark.	176	23.0	16.8	5	5.2	27	9.0	11.6
Red River.								
Shreveport, La.	449	29.2	3.8	1	— 1.3	30	0.4	5.1
James River.								
Lynchburg, Va.	251	18.0	2.5	27	0.5	3	1.2	2.0
Congaree River.								
Columbia, S. C.	....	15.0	3.4	4	0.2	14, 16, 19	1.2	3.2
Savannah River.								
Augusta, Ga	140	32.6	8.8	4	4.6	18	5.8	4.2
Alabama River.								
Montgomery, Ala.	215	48.0	3.8	10,12	0.6	30	2.2	3.2
Willamette River.								
Portland, Oreg	....	15.0	23.8	23-25	15.6	1	21.4	8.2
Sacramento River.								
Redbluff, Cal	....	20.0	6.1	1	2.5	30	4.2	3.6
Sacramento, Cal.	....	28.0	22.3	1	18.5	29,30	20.9	3.8

*To mouth of Mississippi River. †To mouth of Ohio River.

Table IX.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during June, 1896.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
New England.						
Eastport, Me	16	24	9	22	s. 58 w.	15
Portland, Me	18	19	12	26	s. 86 w.	14
Northfield, Vt	23	30	5	11	s. 41 w.	9
Boston, Mass	14	15	15	29	s. 86 w.	14
Nantucket, Mass	12	25	7	31	s. 62 w.	27
Woods Hole, Mass.*	3	19	8	11	s. 11 w.	16
Block Island, R. I	12	17	12	35	s. 78 w.	24
New Haven, Conn	17	22	11	20	s. 61 w.	10
Middle Atlantic States.						
Albany, N. Y	11	30	7	18	s. 30 w.	22
New York, N. Y	15	22	11	25	s. 63 w.	16
Harrisburg, Pa	11	13	17	25	s. 76 w.	8
Philadelphia, Pa	20	19	9	27	n. 87 w.	18
Baltimore, Md	16	23	19	14	s. 36 e.	9
Washington, D. C	18	24	15	13	s. 18 e.	6
Lynchburg, Va	17	20	19	18	s. 18 e.	3
Norfolk, Va	12	21	24	12	s. 53 e.	15
South Atlantic States.						
Charlotte, N. C	15	19	24	14	s. 68 e.	11
Hatteras, N. C	17	21	18	23	s. 51 w.	6
Kittyhawk, N. C	18	19	24	16	s. 83 e.	8
Raleigh, N. C	21	19	16	19	n. 56 w.	4
Wilmington, N. C	10	23	15	28	s. 45 w.	18
Charleston, S. C	9	31	19	18	s. 3 e.	22
Augusta, Ga	17	15	21	20	n. 27 e.	2
Savannah, Ga	14	30	10	15	s. 17 w.	17
Jacksonville, Fla	10	27	22	13	s. 28 e.	19
Florida Peninsula.						
Jupiter, Fla	8	34	22	9	s. 27 e.	29
Key West, Fla	11	24	33	4	s. 66 e.	32
Tampa, Fla	12	18	25	18	s. 49 e.	9
Eastern Gulf States.						
Atlanta, Ga	19	17	18	22	n. 63 w.	4
Pensacola, Fla	16	26	13	21	s. 39 w.	13
Mobile, Ala	20	26	14	16	s. 18 w.	6
Montgomery, Ala	15	19	17	24	s. 60 w.	8
Meridian, Miss	15	29	18	9	s. 33 e.	17
Vicksburg, Miss	12	25	26	14	s. 43 e.	18
New Orleans, La	15	25	23	14	s. 42 e.	14
Western Gulf States.						
Shreveport, La	17	22	24	12	s. 67 e.	13
Fort Smith, Ark	16	6	33	14	n. 62 e.	22
Little Rock, Ark	20	23	21	9	s. 76 e.	12
Corpus Christi, Tex	3	39	26	8	s. 27 e.	40
Galveston, Tex	3	40	13	16	s. 5 w.	37
Palestine, Tex	13	29	24	8	s. 8 e.	16
San Antonio, Tex	9	30	25	7	s. 41 e.	28
Ohio Valley and Tennessee.						
Chattanooga, Tenn	16	21	15	20	s. 45 w.	7
Knoxville, Tenn	22	16	15	22	n. 49 w.	9
Memphis, Tenn	21	18	20	16	n. 53 e.	5
Nashville, Tenn	17	21	14	24	s. 68 w.	11
Lexington, Ky	10	30	12	18	s. 17 w.	21
Louisville, Ky	20	26	8	17	s. 56 w.	11
Indianapolis, Ind	23	21	14	17	n. 56 w.	4
Cincinnati, Ohio	17	15	25	17	n. 76 e.	8
Columbus, Ohio	14	20	24	16	s. 53 e.	10
Pittsburg, Pa	25	15	10	24	n. 54 w.	17
Parkersburg, W. Va	13	21	18	16	s. 14 e.	8
Lower Lake Region.						
Buffalo, N. Y	13	20	15	29	s. 63 w.	16
Oswego, N. Y	7	27	12	24	s. 31 w.	23
Rochester, N. Y	14	15	13	28	s. 86 w.	15
Erie, Pa	17	19	13	22	s. 77 w.	9
Cleveland, Ohio	18	22	23	16	s. 60 e.	8
Sandusky, Ohio	12	17	25	15	s. 63 e.	11
Toledo, Ohio	12	12	26	20	e.	6
Detroit, Mich	20	17	21	17	n. 53 e.	5
Upper Lake Region.						
Alpena, Mich	15	18	19	22	s. 45 w.	4
Grand Haven, Mich	15	15	16	27	w.	11
Marquette, Mich	19	20	14	22	s. 83 w.	8
Port Huron, Mich	26	22	16	6	n. 68 e.	11
Sault Ste. Marie, Mich	10	14	23	26	s. 37 w.	5
Chicago, Ill	20	20	21	15	e.	6
Upper Lake Region—Cont'd.						
Milwaukee, Wis	21	13	29	12	n. 65 e.	19
Greenbay, Wis	13	24	20	14	s. 29 e.	12
Duluth, Minn	29	7	24	17	n. 18 e.	23
North Dakota.						
Moorhead, Minn	21	25	7	14	s. 60 w.	8
Bismarck, N. Dak	23	20	14	13	n. 18 e.	3
Williston, N. Dak	20	20	16	14	e.	2
Upper Mississippi Valley.						
St. Paul, Minn	14	26	18	21	s. 14 w.	12
La Crosse, Wis.†	7	15	6	6	s.	8
Davenport, Iowa	15	12	26	20	n. 63 e.	7
Des Moines, Iowa	20	22	15	16	s. 27 w.	2
Keokuk, Iowa	20	21	16	19	s. 72 w.	3
Cairo, Ill	20	25	15	11	s. 39 e.	6
Springfield, Ill	13	21	14	22	s. 45 w.	11
Hannibal, Mo	16	25	15	20	s. 29 w.	10
St. Louis, Mo	16	24	15	17	s. 14 w.	8
Missouri Valley.						
Columbia, Mo.*	9	10	12	7	s. 79 e.	5
Kansas City, Mo	18	21	22	15	s. 67 e.	8
Springfield, Mo	18	24	18	11	s. 49 e.	9
Omaha, Nebr	18	18	18	19	w.	1
Sioux City, Iowa†	11	11	11	5	e.	6
Pierre, S. Dak	15	32	27	13	s. 39 e.	22
Huron, S. Dak	19	22	26	11	s. 79 e.	15
Northern Slope.						
Havre, Mont	22	14	7	30	n. 71 w.	24
Miles City, Mont	18	17	21	17	n. 76 e.	4
Helena, Mont	6	23	6	40	s. 63 w.	38
Rapid City, S. Dak	14	22	12	23	s. 54 w.	14
Cheyenne, Wyo	18	24	8	24	s. 69 w.	17
Lander, Wyo	21	16	14	25	n. 66 w.	12
North Platte, Nebr	12	24	22	14	s. 34 e.	14
Middle Slope.						
Denver, Colo	18	26	13	15	s. 14 w.	8
Pueblo, Colo	26	10	15	20	n. 17 w.	17
Concordia, Kans	13	33	22	8	s. 35 e.	24
Dodge City, Kans	12	31	32	2	s. 58 e.	36
Wichita, Kans	19	26	27	2	s. 74 e.	26
Oklahoma, Okla	16	27	29	4	s. 66 e.	27
Southern Slope.						
Abilene, Tex	9	36	24	7	s. 33 e.	32
Amarillo, Tex	11	31	19	5	s. 35 e.	24
Southern Plateau.						
El Paso, Tex	15	10	27	22	n. 45 e.	7
Santa Fe, N. Mex	12	26	25	17	s. 30 e.	16
Phœnix, Ariz	6	25	9	30	s. 67 w.	23
Yuma, Ariz	11	21	11	32	s. 65 w.	23
Middle Plateau.						
Carson City, Nev	10	19	5	35	s. 73 w.	31
Winnemucca, Nev	12	21	15	26	s. 51 w.	14
Salt Lake City, Utah	22	15	25	15	n. 55 e.	12
Northern Plateau.						
Baker City, Oreg	25	26	7	12	s. 79 w.	5
Idaho Falls, Idaho	20	29	6	11	s. 29 w.	10
Spokane, Wash	4	30	12	25	s. 27 w.	29
Walla Walla, Wash	9	35	7	14	s. 15 w.	27
North Pacific Coast Region.						
Fort Canby, Wash	24	16	10	21	n. 54 w.	14
Port Angeles, Wash	4	25	5	33	s. 58 w.	35
Seattle, Wash	23	20	13	15	n. 34 w.	4
Tatoosh Island, Wash	8	19	15	29	s. 52 w.	18
Portland, Oreg	28	16	9	30	n. 60 w.	24
Roseburg, Oreg	40	7	13	16	n. 5 w.	33
Middle Pacific Coast Region.						
Eureka, Cal	25	15	5	33	n. 70 w.	30
Redbluff, Cal	25	20	16	18	n. 22 w.	5
Sacramento, Cal	12	32	15	23	s. 22 w.	22
San Francisco, Cal	1	19	0	49	s. 70 w.	52
South Pacific Coast Region.						
Fresno, Cal	30	7	3	43	n. 60 w.	46
Los Angeles, Cal	6	13	12	34	s. 72 w.	23
San Diego, Cal	14	19	3	38	s. 82 w.	35
San Luis Obispo, Cal	18	19	6	26	s. 87 w.	20

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE X.—*Thunderstorms and auroras, June, 1896.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total.		
																																		No.	Days.	
Alabama	56	T.	3	3	4	1	4	2			2	2		1		6	1	1	4	4	5	8	5	5	5	2	2	3	2	9	2	1		87	26	T.
		A.																																0	0	A.
Arizona	49	T.															1	3	5	5	3	2				3	7	3	2	3	2	6		45	13	T.
		A.																																0	0	A.
Arkansas	51	T.	6	5			3	4	1	3							1	2	1		1	1	6	4	4	7	3	5	4	5				66	19	T.
		A.																																0	0	A.
California	202	T.	2	1											1									1	2	2	2	1		1	1	1		15	11	T.
		A.																																0	0	A.
Colorado	80	T.		4		5	7	2		2	4	4	1		2	10	11	5	11	8	8	6	10	13	13	10	5	4	4	8	6	8		171	26	T.
		A.																																0	0	A.
Connecticut	18	T.								1	1	1	1			3							12					1						20	7	T.
		A.										1	1																					2	2	A.
Delaware	6	T.							3	3	4	1				1			2		1		2	1						1				19	10	T.
		A.				1	1						1																					3	3	A.
Dist. of Columbia	4	T.							1	1	1							1					1					1						6	6	T.
		A.																																0	0	A.
Florida	38	T.	2	3	8	8	3	2	1		5	8	12	6	6	1	2	8	8	7	8	3	4	5	4	7	1	6	9	8	10	5		160	29	T.
		A.																																0	0	A.
Georgia	44	T.	7		1					1	2	1						2	3	2	4	1	3	2	2	2	2	1		2	2	1		41	19	T.
		A.																																0	0	A.
Idaho	38	T.	8	5	4	2	4	1		1	2	1			2		1	7	7	8	4	1	5	4	1		3	4	2	1	8	5		91	25	T.
		A.																																0	0	A.
Illinois	100	T.	4	5	4	1	3	16	20	15	3	1		5	2	1	10	11	14		16	18	7	8	6	6	15	4	10	5				210	26	T.
		A.																	1															1	1	A.
Indiana	41	T.			10	5	1	2	5	10	4		1	1	6	1	10	2	2		2	4	8	4	7		8	1						94	21	T.
		A.																																0	0	A.
Indian Territory	9	T.								1																	1					2		4	3	T.
		A.																																0	0	A.
Iowa	101	T.	3	2	1	16	14	14	10				1	1		3	5	6	5	5	13	12	9	8	10	12	14		17	1	1	1		184	25	T.
		A.																													1			1	1	A.
Kansas	90	T.	1		3	8	4	4	6		1		8			5	4	8	4	3	4	12	10	14	10	12	13	4	3		2	2		145	24	T.
		A.																																0	0	A.
Kentucky	46	T.	4		4			2	1	8	4				1		2	2	5			1	2	3	6	2	1	4	6	1				59	19	T.
		A.																																0	0	A.
Louisiana	46	T.	5	6	2	3	1	10	7	2	5	5						1	10	5	3	11	8	4	6	7	5	2		3	13	8		132	24	T.
		A.																																0	0	A.
Maine	17	T.				4	2						1							2			9	1							1			20	7	T.
		A.					1																									1		2	2	A.
Maryland	42	T.					1	2	8	12	13	1			6	1		9	7	3	3		6	5		1		9	1	6				94	18	T.
		A.																																0	0	A.
Massachusetts	82	T.								1	6					4							20	1										32	5	T.
		A.																																0	0	A.
Michigan	79	T.			1	2	18	15	29	7	1			2	1	7	3		1	2	9	8	8			1	18		4					137	19	T.
		A.									2																							2	1	A.
Minnesota	74	T.				12	13	23	9	1		2					7	2	1	14	4	4		2	15	18	3		18		1	1		150	19	T.
		A.	1					1																				1		1				4	4	A.
Mississippi	47	T.	8	4		1	2	3	4	1	10	1					2	8	5	7	5	10	6	2	4	9	2	4		5	8	2		113	24	T.
		A.									1																							1	1	A.
Missouri	103	T.	20	7	4	5	2	22	30	14	1		2	1		1	21	3	13	3	5	9	26	23	8	12	24	16	19	2				293	26	T.
		A.																													1			1	1	A.
Montana	42	T.	5	4	2		2	2			1	2	1	1	4	2	2		2	4	1	3	6	3	3	2		1		1	3	4		61	24	T.
		A.		1																														1	1	A.
Nebraska	130	T.			4	8	8	13	1			1	3					9	2	12	13	8	5	12	5	14	4		5	1	5	3		136	21	T.
		A.								1								1																2	2	A.
Nevada	50	T.	1													1		2	1				1	3	1	4	4	2						20	10	T.
		A.																																0	0	A.
New Hampshire	23	T.									1	1											9								1			11	4	T.
		A.	1		1	1	1					1							1												1			7	7	A.
New Jersey	51	T.						1	1	20	16	7			3	7		2	9	3		3	22				2	4	1	8	1			107	17	T.
		A.											1	1					1															3	3	A.
New Mexico	37	T.								1	2	3			1	2	1	3	3	2	2	3	3	2	3	2	3	3	6	5	2	4		57	21	T.
		A.																																0	0	A.
New York	95	T.				2	5	8	10	13	9	3	1			3		10	11	1	1		13				2	1	1	7	1			102	19	T.
		A.					1																											1	1	A.
North Carolina	60	T.	9	2	2			3	1	9	20	2			12	1		9	14	17	14	6	10	15	16	14	14	8	4	13	3	1		219	25	T.
		A.																																0	0	A.
North Dakota	40	T.			3	4		2				3				2	4	4	6	3	7		1	4	1	4	1	1	2	1	1			54	19	T.
		A.					1				1	1					1														3			7	5	A.
Ohio	137	T.		1	24	12	33	39	43	40	19			13	34	1	29	10	2	2	1	23	35	7	11	16	17	8	1	3				434	25	T.
		A.																												1				1	1	A.
Oklahoma	23	T.							4	1			4						4	1			5	4	4		3	2	1			1		34	12	T.
		A.																																0	0	A.
Oregon	60	T.	1		1	1					1							1		3			3					6		5	2			24	10	T.
		A.																																0	0	A.
Pennsylvania	96	T.			3	4	5	5	12	24	11	3			5	1		12	12	2	1	7	21	1	1	3	1	2		10	2			148	23	T.
		A.											1																					1	1	A.
Rhode Island	8	T.								1						1																		2	2	T.
		A.																																0	0	A.
South Carolina	40	T.	13	6						3	14			2	2				3	4	10	6	5	4	5	7	2	5	3	5	3	3		105	20	T.
		A.																																0	0	A.
South Dakota	44	T.			2	6	3	11	1	1	1	4	3			2	3	2	4	3	3	4	1	4	4	5	1	2	1	1	1	2		75	26	T.
		A.																																0	0	A.
Tennessee	51	T.	11	1	1		1	2	7	13	13	2			1		1	5	9	1	2	6		1	5	3	3	7	5					100	22	T.
		A.																																0	0	A.
Texas	88	T.	1	4			3				7	8	8	2	2				1	4	3	3	4	1		5	3		1	4	5	3		72	20	T.
		A.																																0	0	A.
Utah	38	T.														1		2	2	2		2	1	3	6	5	1	2	2	3	5			37	14	T.
		A.																																0	0	A.
Vermont	16	T.									2								3				9	2		1	1							18	6	T.
		A.																																0	0	A.
Virginia	43	T.	1				2	7	10	8	9			1	2	1	2	10	9	10	5	2	8	9	2	1	4	8	1	5		1		118	24	T.
		A.																																0	0	A.
Washington	54	T.					1											1	1									7	1	16	6	1		34	8	T.
		A.																																0	0	A.
West Virginia	40	T.			5	1	4	6	3	9	4	2	1	2	4	3	5	9	6	3	1	2	3	7	4	8	4	3	2	1				102	26	T.
		A.																																0	0	A.
Wisconsin	58	T.				1	14	20	17	2	1			1	1	15	9			8	16	15	3		6	13	7	1	13	4		1		168	21	T.
		A.		1																			1							1	2			5	4	A.
Wyoming	12	T.		1															1	1	1		1									1		6	6	T.
		A.																																0	0	A.
Sums	2,799	T.	115	64	93	112	163	243	245	229	200	69	48	39	98	87	137	172	213	160	179	204	336	198	180	220	206	146	151	154	98	68	....	4,622	....	T.
		A.	2	2	1	2	5	1	0	1	4	3	4	1	0	0	1	1	3	0	0	0	1	0	0	0	0	1	0	3	8	1	....	45	....	A.

TABLE XI.—*Hourly sunshine as deduced from sunshine recorders, June, 1896.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Monthly summary.			
		A. M.								P. M.								Instrumental record.			Personal estimate.
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Per cent of possible.	
																		Hours.	Hours.		
Atlanta, Ga	T.	33	43	70	88	95	96	96	96	95	86	80	88	79	63	34	21	335.9	431.5	78	60
Baltimore, Md	T.	40	39	39	41	46	53	55	52	66	59	49	41	38	31	27	26	199.6	445.9	45	37
Bismarck, N. Dak	P.	63	66	70	76	73	74	75	78	73	72	71	75	61	51	47	47	319.3	475.6	67	60
Boston, Mass	T.	40	42	47	50	59	61	65	71	72	69	67	59	49	53	57	39	260.1	456.2	57	52
Buffalo, N. Y.*	T.																				
Chicago, Ill	T.	55	63	71	81	94	97	97	96	96	95	95	88	87	81	70	57	382.9	456.2	84	63
Cincinnati, Ohio	T.	53	58	58	74	84	89	92	92	93	99	96	90	83	84	73	62	363.1	445.9	81	57
Cleveland, Ohio	P.	33	30	51	60	66	69	60	64	72	80	81	86	74	69	51	47	288.8	456.2	63	50
Columbus, Ohio	T.	20	21	38	55	64	76	75	58	57	70	69	70	63	46	28	26	243.4	449.0	54	44
Denver, Colo	P.	73	75	84	87	92	93	91	76	59	55	52	54	50	49	31	25	299.1	449.0	67	50
Des Moines, Iowa	T.	40	40	41	51	59	70	74	78	75	71	64	58	56	60	64	67	277.5	456.2	61	39
Detroit, Mich	T.	40	40	57	67	74	83	82	84	91	91	86	80	73	61	48	45	320.2	456.2	70	61
Dodge City, Kans	P.	64	67	76	82	87	87	83	88	80	88	88	89	83	61	41	33	341.8	443.1	80	64
Dubuque, Iowa	T.	19	22	51	72	82	92	96	94	91	88	84	79	78	66	51	45	325.4	456.2	71	45
Eastport, Me	P.	29	41	68	63	73	75	70	67	65	67	69	67	57	51	42	41	277.7	466.7	60	45
Eureka, Cal	P.	20	22	23	36	54	63	63	66	77	78	73	73	75	75	66	30	261.4	451.9	58	57
Galveston, Tex	P.	...	50	82	91	94	95	98	95	99	99	99	94	90	85	63	50	369.3	419.0	88	82
Helena, Mont	P.	73	77	81	88	84	84	81	72	61	64	65	63	63	61	60	58	337.5	475.6	71	68
Kansas City, Mo	P.	34	32	46	47	54	56	56	56	55	61	70	69	70	66	54	66	251.0	445.9	56	46
Little Rock, Ark	T.	57	57	63	81	86	86	91	90	90	84	84	81	78	73	52	46	336.3	434.3	77	48
Louisville, Ky	T.	60	60	65	61	75	81	87	78	87	85	82	78	72	61	59	61	323.2	443.1	73	45
Minneapolis, Minn	T.	60	66	73	80	82	85	88	88	85	73	70	71	69	67	62	43	342.4	466.7	73	......
New Orleans, La	T.	33	37	57	67	67	82	84	78	79	76	69	58	56	48	16	12	262.1	420.9	62	62
New York, N. Y	T.	28	33	42	56	60	56	62	64	67	70	61	58	54	40	26	21	232.6	451.9	51	50
Northfield, Vt	P.	16	30	50	57	64	64	57	56	52	60	57	59	60	41	40	39	236.5	463.5	51	37
Philadelphia, Pa	T.	47	47	60	64	67	73	79	80	78	79	83	78	66	59	42	37	298.6	449.0	67	37
Phœnix, Ariz	P.	96	97	97	100	100	100	100	100	100	100	100	97	94	94	94	100	420.5	428.7	98	87
Portland, Me	T.	6	24	58	68	71	73	74	79	81	76	83	77	65	63	25	0	267.2	463.5	60	38
Portland, Oreg	T.	47	44	45	40	52	60	66	69	71	75	74	79	69	61	60	62	287.0	471.7	61	61
Do	P.	47	48	50	47	56	59	62	67	69	72	72	80	74	71	61	62	294.7	471.7	62	61
Rochester, N. Y	T.	58	61	67	76	84	87	77	79	85	80	76	73	81	74	63	60	342.2	459.9	74	67
St. Louis, Mo	T.	53	53	59	65	67	70	79	83	90	85	83	85	76	65	53	49	317.4	445.9	71	49
Salt Lake City, Utah	P.	70	75	83	88	93	93	92	94	96	89	83	86	75	73	60	56	373.4	451.9	83	49
San Diego, Cal	P.	11	10	14	30	52	62	74	75	74	81	85	84	80	68	60	60	258.0	428.7	60	58
San Francisco, Cal	T.	28	41	55	66	77	92	91	94	94	97	97	94	83	74	65	35	343.3	443.1	77	70
Santa Fe, N. Mex	P.	71	75	93	95	94	86	88	85	80	82	82	80	76	61	46	31	345.6	437.2	79	64
Savannah, Ga	P.	36	44	61	64	70	71	72	73	65	63	58	47	51	44	30	28	245.9	425.8	58	29
Vicksburg, Miss	T.	27	32	43	63	87	93	95	93	95	92	86	88	81	74	64	55	328.4	425.8	77	70
Washington, D. C	P.	30	33	45	49	56	60	58	61	62	61	67	51	51	38	34	35	226.3	445.9	51	44
Wilmington, N. C	T.	3	4	11	54	60	70	72	74	76	72	63	55	47	25	10	10	208.9	431.5	48	38

* Record incomplete.

TABLE XII.—*Maximum rainfall in one hour or less, June, 1896.*

Stations.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		Inch.		Inch.	
Atlanta, Ga	0.19	19	0.36	19	0.58	19
Baltimore, Md	0.35	16	0.55	16	0.93	8
Bismarck, N. Dak	0.18	6	0.23	6	0.42	6
Boston, Mass	0.15	9	0.18	9	0.22	9
Buffalo, N. Y	0.20	7	0.26	7	0.28	26
Chicago, Ill	0.29	20	0.36	20	0.40	19
Cincinnati, Ohio	0.21	23	0.34	23	0.47	23
Cleveland, Ohio	0.30	8	0.47	8	1.77	8
Denver, Colo	0.14	24	0.16	24	0.19	24
Detroit, Mich	0.40	25	0.70	25	1.19	25
Dodge City, Kans	0.26	21	0.45	21	0.85	21
Duluth, Minn	0.15	27	0.25	27	0.42	27
Eastport, Me	0.15	21	0.16	21	0.31	21
Galveston, Tex	0.18	10	0.26	10	0.31	10
Indianapolis, Ind	0.15	23	0.22	23	0.70	15
Jacksonville, Fla	0.45	4	0.82	4	1.99	4
Jupiter, Fla	0.31	9	0.45	9	1.05	18
Kansas City, Mo	0.08	21	0.11	21	0.33	21
Key West, Fla	0.29	6	0.36	6	0.47	11
Little Rock, Ark	0.25	2	0.50	2	1.11	2
Louisville, Ky	0.55	23	1.00	23	1.37	23
Memphis, Tenn	0.27	27	0.45	27	0.49	9
Milwaukee, Wis	0.15	7	0.16	7	0.26	7
Nantucket, Mass	0.15	28	0.17	28	0.31	28
Nashville, Tenn	0.11	1	0.15	1	0.28	1
New Orleans, La	0.21	21	0.35	21	1.14	21
New York, N. Y	0.19	10	0.31	10	0.56	17
Norfolk, Va	0.49	9	0.65	9	1.45	9
Omaha, Nebr	0.40	5	0.52	5	0.64	5
Philadelphia, Pa	0.10	28	0.13	28	0.37	9
Portland, Me	0.10	21	0.19	21	0.50	21
Portland, Oreg	0.19	9	0.22	9	0.24	9
Rochester, N. Y	0.26	15	0.45	15	0.65	9
St. Louis, Mo	0.40	21	0.55	21	0.58	21
St. Paul, Minn	0.28	24	0.38	24	0.78	6
Salt Lake City, Utah	......	......	0.02	5	0.09	5
San Diego, Cal.*	......	......	......	......	......	......
San Francisco, Cal*	......	......	......	......	......	......
Savannah, Ga	0.34	28	0.55	28	0.70	28
Seattle, Wash	0.01	9	0.02	9	0.07	9
Vicksburg, Miss	0.35	22	0.66	22	1.15	6
Washington, D. C	0.16	28	0.24	28	0.37	9
Wilmington, N. C	0.25	24	0.36	24	0.96	25

* Less than 0.05 inch in one hour.

TABLE XIII.—*Excessive precipitation, by stations, for June, 1896.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	Inches.	Inches.		Ins.	h.m.	
Brewton	11.00	3.50	4-5			
Daphne	13.15	3.20	5			
Evergreen		3.10	7-8			
Greensboro		3.55	18-19			
Madison Station		2.52	8-9			
Montgomery		2.62	19	1.15	0 35	19
Selma				2.00	2 00	19
Union		3.43	2			
Union Springs		4.40	20			
Uniontown	10.19	3.38	2			
Arkansas.						
Fulton				1.45	1 00	3
Jonesboro				1.12	1 00	24
Little Rock				1.11	1 00	2
Osceola				1.21	1 00	27
Rison				1.66	1 10	23
Stuttgart		2.69	23			
Colorado.						
Longmont		4.62	30	4.62	1 30	30
Connecticutt.						
Middletown		2.50	14			
Florida.						
Archer	14.46	4.10	3			
Do		2.90	11			
Brooksville	11.94	3.51	19	3.51	3 30	19
Carrabelle		4.40	2-3			
Earnestville	17.92	3.30	19	1.02	0 20	26
Do		4.03	27			
Emerson	15.40	2.78	3			
Do		3.98	11			
Federal Point		2.65	10-11			
Fort Meade	13.30					
Frostproof	11.04					
Gainesville	11.14	3.05	4			
Do		2.86	12			
Jacksonville		3.07	3-4	1.99	1 00	4
Do				1.16	1 00	19
Jupiter				1.05	1 00	18
Kissimmee	12.57	2.57	13			
Lake Butler		3.41	3			
Do		2.50	19			
Lake City	10.36	2.70	10-11			
Lemon City	13.55	4.50	13-14			
Macclenny	10.12	2.78	12			
Merritts Island	10.45					
Milton	14.08					
Mullet Key	10.02	3.40	28			
Myers	20.90	3.70	13	1.71	1 00	16
Ocala	12.98	3.52	3-4			
Orange City	10.96	7.53	3-4			
Orange Park		2.78	11			
Orlando	11.18					
Oxford				1.50	1 00	16
Do				1.60	1 30	26
Pensacola	12.46	2.99	2-3			
Plant City	16.44	2.71	4			
Do		2.51	10-11			
Do		2.97	12-13	1.65	1 15	21
Quincy	13.02					
Tallahassee	10.17					
Tampa	13.42	2.71	2-3			
Do		4.55	28-29			
Tarpon Springs		2.90	28			
Georgia.						
Camak				2.07	1 20	1
Morgan		2.80	8			
Illinois.						
Albion		3.42	22-23			
Carlinville		3.20	7	3.20	1 10	7
Charleston				1.45	1 16	20
Chester		2.80	22-23			
Friend Grove		2.56	23-24			
Laharpe				1.15	1 00	24
Mount Pulaski		3.36	8			
Palestine				1.70	1 00	24
Rantoul		2.72	7			
Springfield		4.03	7-8	1.57	1 00	7
Walnut				1.33	1 00	20
Indiana.						
Edwardsville		2.81	23			
Evansville		3.10	26-27	2.00	0 48	26
Jasper				1.35	1 00	27
Laconia				1.50	1 00	27
Madison		3.53	22			
Rockville				1.88	1 00	15
Scottsburg		3.16	23			
Valparaiso		2.68	7			
Vincennes		3.25	23			
Washington		2.75	23			
Indian Territory.						
Tulsa		2.80	26			
Iowa.						
Adair				1.00	0 40	6
Alta		3.45	23	3.45	2 45	23
Atlantic		3.06	22	3.06	1 30	22
Dubuque				1.20	0 32	20
Grundy Center				1.20	1 10	24
Iowa Falls		2.99	24-25			
Logan		4.91	5			
Malvern				1.06	0 30	21

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Iowa—Continued.	Inches.	Inches.		Ins.	h.m.	
Mason City		4.00	17-18			
Osceola				1.55	1 30	15
Rock Rapids		3.41	6			
Washington				1.08	1 00	7
Waverly		2.78	19			
Winterset		2.80	15			
Kansas.						
Abilene		5.75	4-5			
Assaria		4.00	4			
Augusta		3.00	7-8			
Colby				1.45	1 05	18
Do				1.38	0 40	24
Columbus		4.04	26-27			
Eureka		2.65	7			
Marion		3.25	21			
Oberlin				1.77	1 00	25
Russell				2.35	1 30	6
Do				1.20	1 00	16
Salina		5.48	4			
Wakefield				2.28	1 05	20
Wellington		2.59	20-21			
Wichita				1.20	0 22	7
Kentucky.						
Alpha				1.00	0 20	1
Do				1.15	0 30	28
Anchorage		2.50	23	1.10	1 00	8
Blandville	11.22	4.28	15-16			
Do		3.37	26			
Caddo		3.20	8			
Carrollton		2.57	23-24			
Falmouth				1.40	0 55	6
Frankfort				1.20	0 15	27
Henderson				2.45	2 15	27
Hopkinsville				2.43	2 00	1
Louisville		2.87	22-23	1.37	0 36	23
Mount Sterling				1.45	0 40	6
Pryorsburg		2.50	14-15			
Louisiana.						
Abbeville		2.50	22-23			
Baton Rouge		3.14	7			
Cameron				1.10	0 50	10
Clinton				1.42	0 55	29
Covington		3.17	7	1.05	0 35	11
Donaldsonville		3.13	7			
Emilie	12.18	6.35	6			
Grand Coteau		3.30	6			
Hammond				1.80	1 00	10
Farmerville		2.93	22-23			
Liberty Hill				1.26	1 00	21
Mansfield				1.28	0 30	6
Do				1.50	0 45	21
Maurepas		3.98	6			
New Iberia		3.40	23	2.10	0 45	21
New Orleans				1.14	1 00	21
Paincourtville	10.94	3.21	23			
Rayne		5.20	6			
Schriever	10.64	4.30	23-24			
Southern University		2.50	23			
Sugar Experiment Station	11.04	3.81	23			
Thibodeaux		3.78	23			
Wallace	12.84	6.05	6			
West End		2.80	23			
Maryland.						
Frederick				1.05	1 00	8
Laurel				1.00	1 00	28
Princess Anne				1.30	1 00	22
Sharpsburg				1.08	0 48	8
Michigan.						
Alma		2.90	7			
Battle Creek		3.04	7-8			
Berlin				1.18	1 00	7
Detroit				1.19	0 50	25
Fitchburg				1.01	1 00	25
Hanover		3.60	7-8	1.00	0 15	20
Harrisville				2.38	1 00	5
Mackinaw City		3.00	8			
North Marshall		3.20	7-8			
Olivet		2.51	7			
Minnesota.						
Albert Lea		2.60	24			
Bird Island		3.86	6			
Camden		3.20	6			
Clear Lake		2.65	23			
Dawson		3.00	6			
Detroit City		4.00	5			
Fergus Falls		4.60	5			
Grand Portage				1.03	1 00	17
Granite Falls		2.87	6			
Lakeside		2.80	6	1.60	1 30	24
Lesueur		3.88	6			
Luverne		6.51	6			
Montevideo		2.65	6			
New Ulm		2.75	6	1.01	1 00	24
St. Charles				1.98	1 00	24
St. Olaff				1.30	0 50	4
Mississippi.						
Batesville		3.25	2			
Crystal Springs		3.00	2			
French Camps				2.12	2 00	24
Hazlehurst	10.21	5.07	21			

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Mississippi—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Itta Bena				1.49	1 00	16
Louisville				1.00	1 00	16
Meridian				1.75	1 00	6
Vicksburg				1.15	1 00	6
Waynesboro		2.90	3			
Missouri.						
Arlington				1.56	1 10	23
Darksville				2.10	2 00	7
Eldon				1.71	1 00	25
Gayoso		2.95	19	2.95	2 00	19
Halfway		3.05	7			
Do		2.89	27			
Hastain		2.96	25-26	2.40	1 30	22
Do		2.80	27	2.83	0 50	25
Houston		3.21	22-23	1.10	1 00	8
Lebanon		5.50	7			
Liberty		3.43	1	3.43	3 00	1
McCune		2.50	7			
Mexico		5.60	7	5.60	4 25	7
Neosho				1.18	1 00	7
Do		4.30	22	4.30	3 00	22
Nevada		2.63	26-27			
New Madrid				1.26	1 00	8
Shelbina				2.00	2 00	7
Montana.						
Fort Custer		2.50	13-14			
Do		2.50	25			
Wibaux		2.82	6-7			
Nebraska.						
Albion		3.51	6			
Arapaho		2.60	21	2.60	1 10	21
Do		2.65	29			
Arcadia		4.55	5			
Ashton		3.80	5			
Beaver City		2.73	29			
Bluehill		4.85	24	1.25	1 00	22
Creighton		2.99	6			
Elba		5.60	5			
Ericson		2.70	6			
Greely Center	16.17	12.00	5			
Hastings				1.04	1 00	23
Loup *b*	11.78	10.06	5			
North Loup		5.97	5	5.97	4 00	5
Oakdale				1.20	1 00	20
Odell		3.31	24-25			
O'Neill		3.15	6-7			
Ord		4.55	6			
Sutton				1.22	1 15	20
Tekamah				1.35	1 00	6
Thedford				1.70	1 00	5
Do				1.70	1 05	19
Wakefield				1.84	1 00	4
Do				2.36	1 00	6
New Jersey.						
Billingsport		2.62	14			
Bridgeton		2.72	13-14			
Camden		2.50	14			
Egg Harbor City		3.86	13-14			
Linwood	13.07	9.72	13-14			
Millville		2.59	13-14			
Ocean City	13.45	10.40	13-14			
Perth Amboy		2.83	14			
Vineland		4.20	13-14			
Woodbine		3.35	14			
New York.						
Bloomville				1.00	0 30	11
Brooklyn		2.86	14			
Cooperstown		2.68	8			
New York		2.59	13-14			
Oxford				1.00	1 00	8
Palermo				1.00	0 55	28
Setauket		2.74	14			
South Canisteo		2.62	9-10	1.22	0 10	9
Wedgwood		3.45	16-17			
Willetspoint				1.01	1 00	10
North Carolina.						
Greensboro		2.74	3-4			
Monroe		2.64	24	1.38	1 15	9
Oakridge	10.06					
Pantego	11.57	3.53	19	3.53	2 00	19
Do		4.36	23	4.36	2 00	23
Pittsboro		2.75	13			
Roxboro				1.63	1 00	18
Salem		2.52	3			
Saxon				1.12	1 00	28
Settle				1.37	1 00	23
Willeyton	10.18					
North Dakota.						
Buxton		3.59	4			
Medora		2.65	7	1.00	1 00	20
Sheyenne				1.00	1 00	4
Wahpeton		3.65	4	3.65	1 00	4

TABLE XIII.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Ohio.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Akron		3.60	7			
Auburn				1.35	0 15	7
Bement				2.05	1 00	7
Bissell				2.31	1 40	7
Canfield		3.80	7-8	2.50	1 10	7
Canton		3.77	6	1.11	1 00	9
Cleveland		3.10	7-8	1.77	1 00	8
Hudson		2.63	6	1.01	1 00	24
New Waterford		3.16	7-8			
Sandusky				1.10	1 00	7
Sharon Center				1.27	0 30	21
Strongsville				2.10	1 10	7
Urbana				1.15	1 10	6
Vickery				1.10	0 15	7
Walnut				1.30	1 00	5
Warren	10.78					
Oklahoma.						
Arapaho		3.74	25-26			
Enid		2.50	21			
Stillwater		3.96	25-26			
Winnview		2.60	25-26			
Woodward		3.00	25-26			
Pennsylvania.						
Driftwood		3.33	24			
Duncannon				1.35	1 00	21
East Mauch Chunk				1.02	0 37	17
Girardville				1.01	1 00	21
Greensboro				1.00	0 20	17
Indiana		5.20	24			
Johnstown				1.40	1 05	16
Philadelphia *b*		2.58	13-14			
Renovo				1.96	1 10	6
Ridgway		2.75	24-25			
St. Marys		2.70	24			
West Chester		2.63	17	2.60	0 50	17
South Carolina.						
Anderson				1.00	1 00	23
Cheraw *b*		2.65	23-24			
Darlington (near)		4.50	24	4.50	3 30	24
Gillisonville				1.50	1 15	18
Kingstree *b*		3.18	3-4			
Do		2.76	10			
Little Mountain				1.00	0 40	9
Longshore				1.26	0 45	1
St. George	10.45			1.60	1 30	10
Trial		2.80	3-4			
South Dakota.						
Alexandria		2.62	5-6			
Canton		4.45	6			
Castlewood		2.86	6			
Cross		5.17	6	4.00	2 00	6
Farmingdale		3.38	6			
Flandreau		3.45	6			
Forestburg		3.75	6			
Greenwood		3.04	6			
Huron		3.60	5-6	1.10	0 50	6
Kimball		3.05	6			
Silver City		3.06	5-6			
Sioux Falls		4.13	6			
Tyndall		3.00	6			
Wessington Springs		5.37	6	1.75	0 15	6
Tennessee.						
Benton (near)		2.87	9			
Brownsville		3.50	27-28			
Decatur		2.70	8-9			
Elk Valley				2.10	2 00	*
Knoxville				1.25	1 00	9
Nunnelly				1.15	0 50	8
Riddleton				1.14	0 20	27
Savannah				1.15	0 30	23
Union City		3.02	†			
Texas.						
Beeville				1.05	0 50	12
Durham				1.01	1 00	29
Fort Ringgold		3.50	12			
Graham				2.00	1 00	30
Lufkin				1.78	0 45	29
Stafford				2.15	2 00	2
Virginia.						
Callaville				1.55	1 30	28
Norfolk		2.54	9	1.45	1 00	9
Do				1.09	1 00	17
Do				1.28	1 00	22
Warsaw				1.98	0 30	18
West Virginia.						
Martinsburg				1.24	1 00	6
Monarch		3.90	24			
Spencer				1.40	1 00	8
Wisconsin.						
Eau Claire		2.80	6			
Grantsburg				1.65	1 30	27
Osceola		2.90	23	2.90	2 30	23

* May 31. † May 31 to June 1.

Chart I. Tracks of Centers of Low Areas. June, 1896.

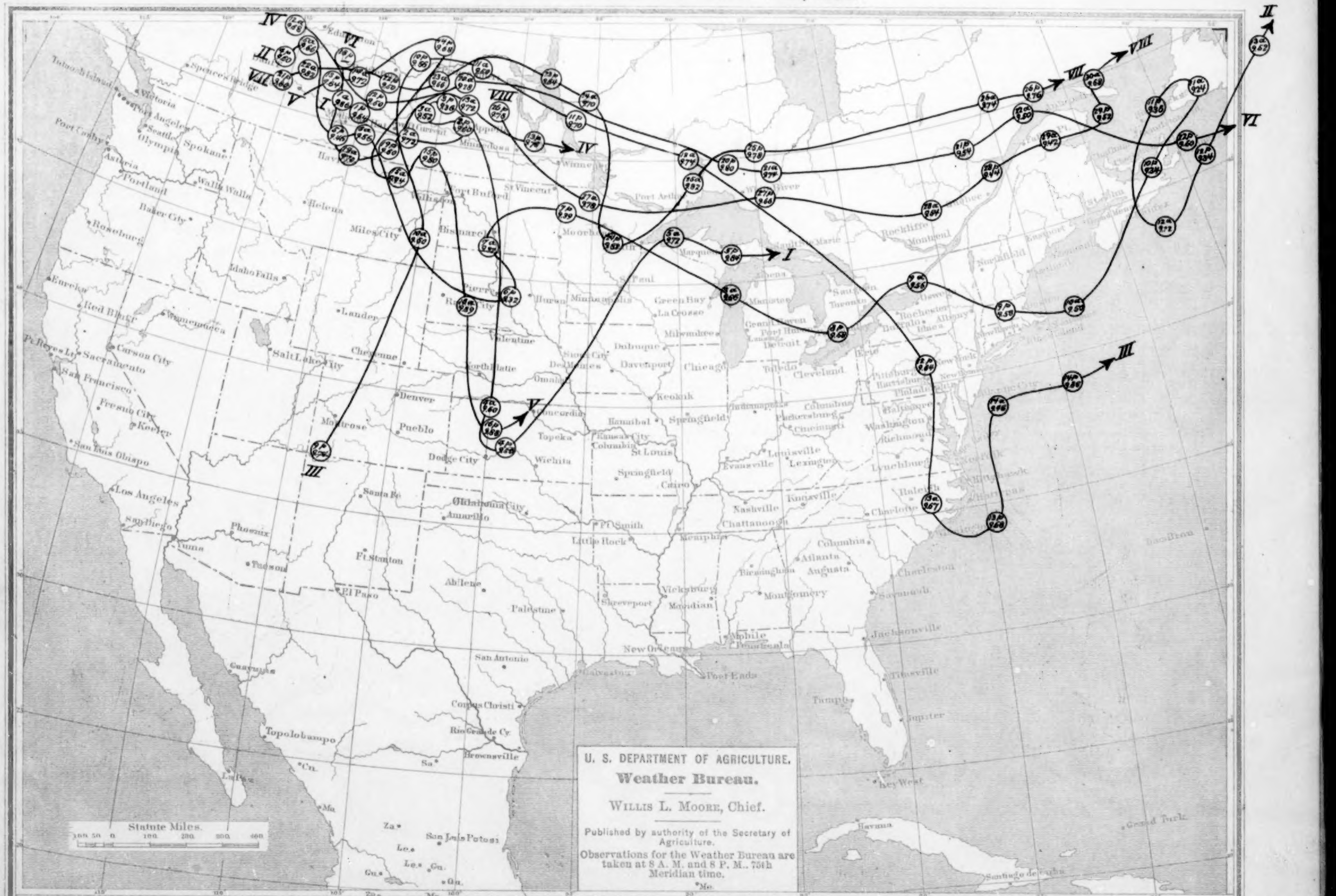


Chart II. Tracks of Centers of High Areas. June, 1896.

Chart III. Total Precipitation. June, 1896.

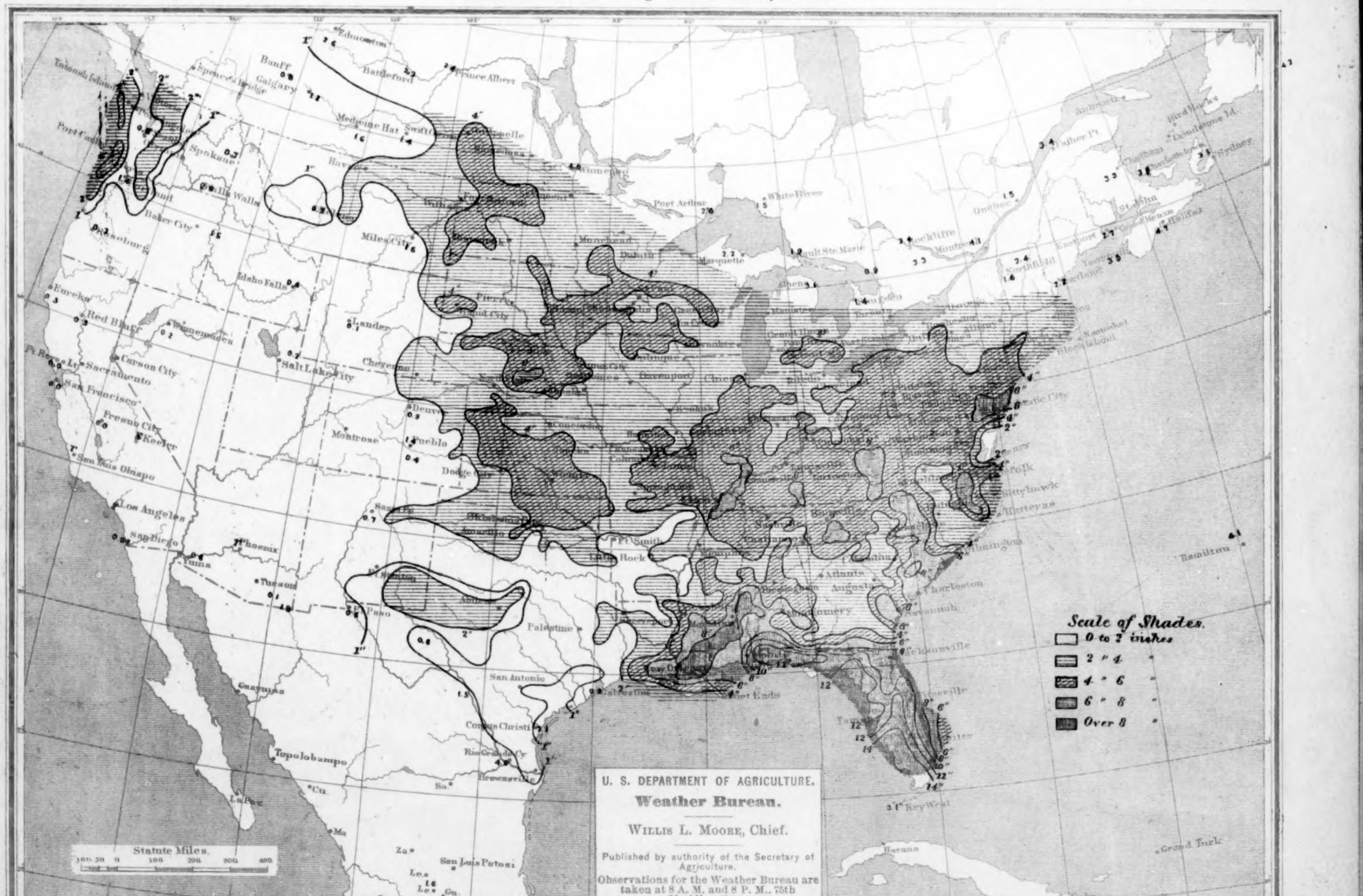


Chart IV. Isobars, Isotherms, and Resultant Winds. June, 1896.

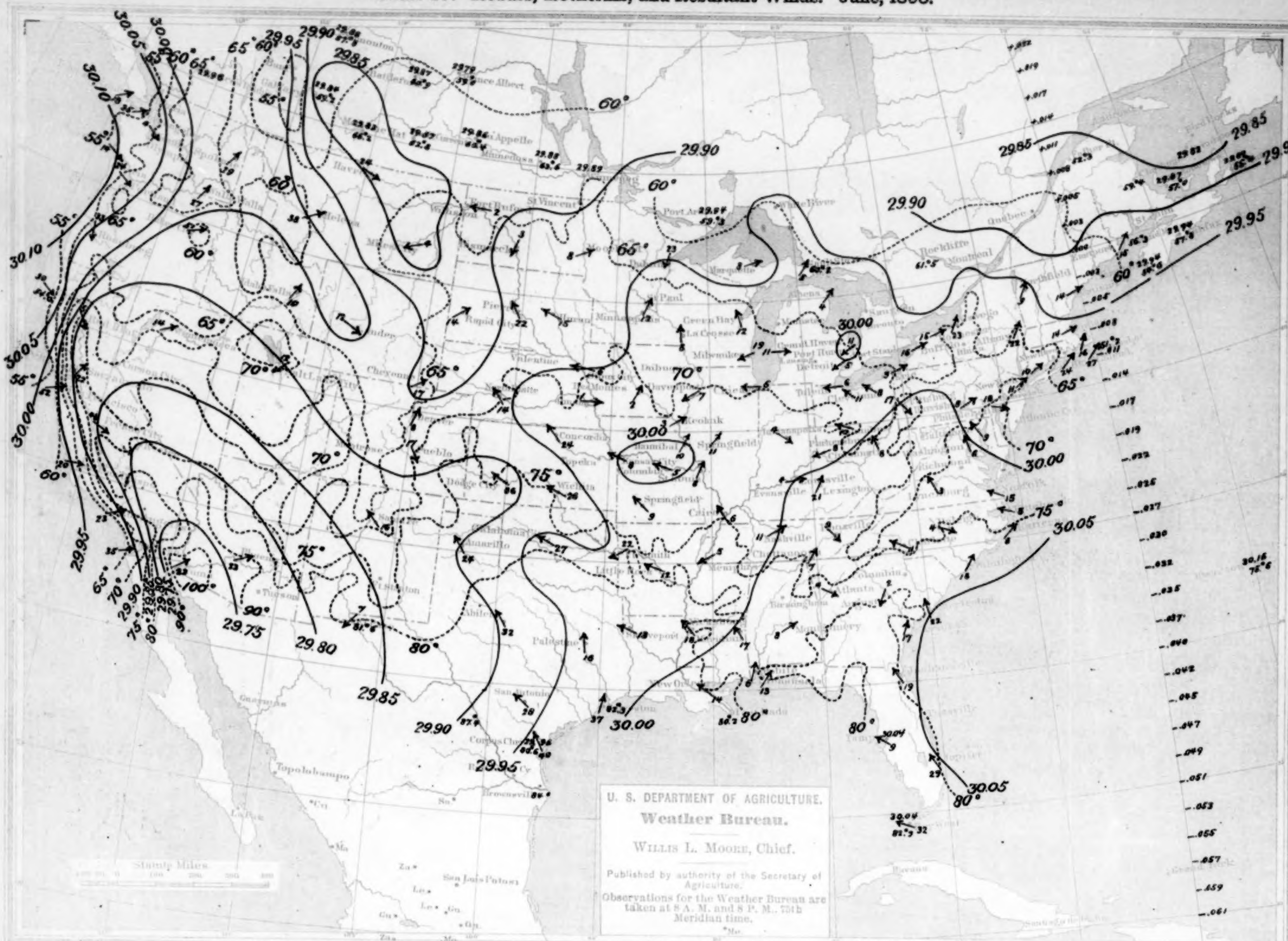
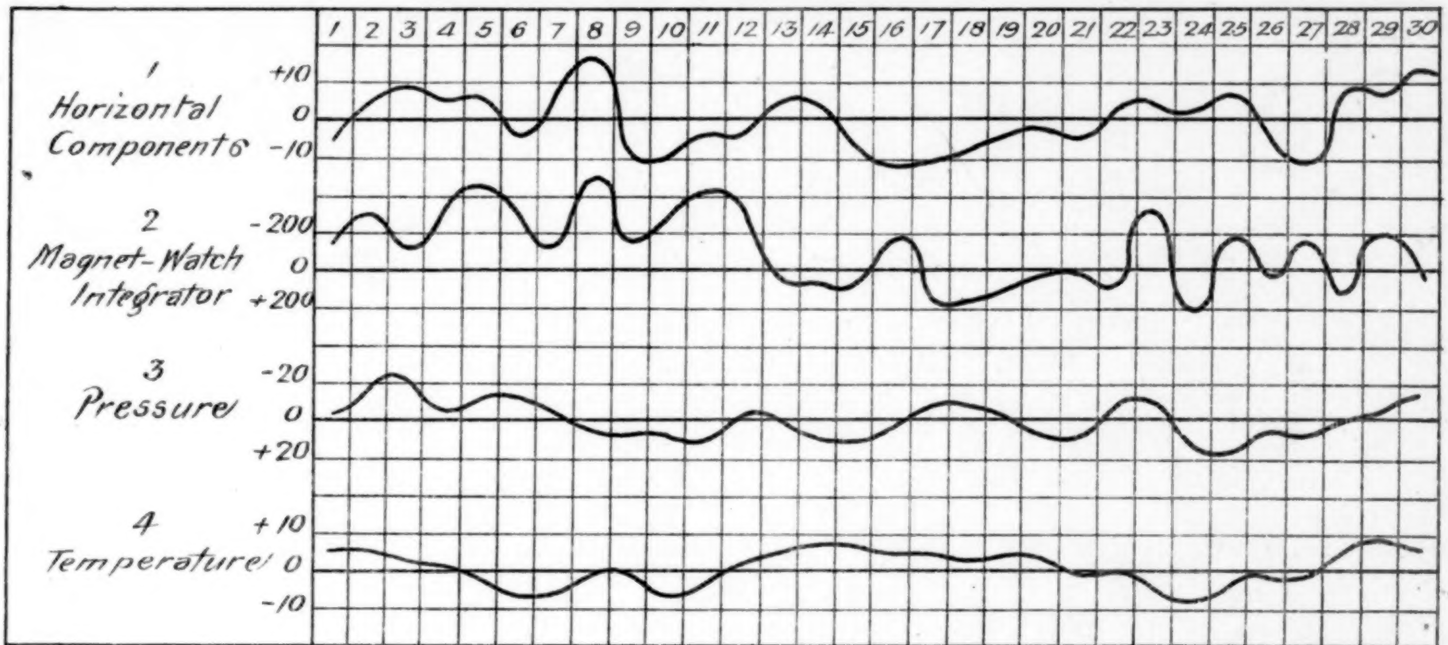


Chart V. Relative Variations of the Horizontal Magnetic Force, the Magnet-Watch Integrator, and the Northwest Pressures and Temperatures. June, 1896.



June 1896	Washington and Toronto Deflecting Magnetic Forces.						Weather Bureau Magnet-Watch.		Northwest Pressure		Northwest Temperature	
	H	D	dx	dy	σ	β	Noon	Δt	P	ΔP	T	ΔT
							h. m. s.	s				
1	66	4.7	-4	0	-4	180	11. 3. 5	-152	29.85	-2	62	+5
2	74	5.0	+4	+2	+5	27	58 44	-261	29.71	-16	62	+4
3	76	3.5	+6	-6	+8	315	56 29	-135	29.65	-21	60	+2
4	74	5.1	+4	+2	+5	27	50 3	-386	29.83	-3	59	+1
5	73	5.4	+3	+4	+5	55	43 0	-420	29.75	-11	57	-2
6	68	5.1	-2	+2	-3	135	37 33	-327	29.73	-12	54	-5
7	72	4.0	+2	-4	+5	306	35 41	-112	29.84	-1	54	-5
8	84	3.6	+15	-6	+16	338	28 12	-449	29.88	+4	58	-2
9	59	5.0	-10	+2	-10	169	25 54	-138	29.90	+6	60	0
10	62	5.8	-6	+6	-9	135	20 46	-308	29.89	+5	54	-7
11	63	4.8	-5	+1	-5	168	13 54	-412	29.93	+8	59	-2
12	64	4.5	-3	-1	-3	198	10 12	-222	29.83	-2	64	+2
13	70	4.1	+3	-3	+4	315	10 52	+40	29.87	+2	66	+4
14	69	5.1	+3	+2	+4	34	11 42	+50	29.95	+9	68	+5
15	57	4.8	-9	+1	-9	173	12 57	+75	29.95	+9	70	+7
16	57	6.4	-8	+8	-12	135	9 52	-185	29.91	+5	69	+5
17	55	5.2	-10	+2	-10	169	12 42	+170	29.78	-9	69	+5
18	56	5.1	-8	+2	-8	165	14 41	+119	29.82	-5	68	+3
19	62	5.4	-2	+3	-4	125	16 26	+105	29.84	-3	69	+4
20	61	4.6	-3	-1	-3	197	16 44	+18	29.93	+5	68	+3
21	61	5.6	-2	+4	-5	117	17 2	+18	29.96	+8	65	-1
22	65	5.1	+2	+2	+3	45	18 24	+82	29.81	-7	65	-1
23	63	5.4	0	+3	+3	90	13 56	-268	29.82	-6	60	-6
24	63	5.1	+1	+1	+1	45	18 6	+250	30.04	+15	60	-7
25	67	4.5	+5	-2	+5	338	15 37	-149	30.07	+16	63	-4
26	59	3.6	-3	-7	-8	246	15 49	+12	29.96	+7	64	-3
27	49	4.5	-12	-2	-12	189	13 52	-117	29.97	+7	65	-2
28	67	4.2	+6	-4	+7	326	15 48	+116	29.90	0	73	+6
29	67	4.6	+6	-2	+6	342	12 28	-200	29.85	-5	75	+7
30	74	4.6	+13	-2	+13	351	12 40	+12	29.76	-15	74	+6

Chart VI. Kite Experiments at the Weather Bureau.

Fig. 57.

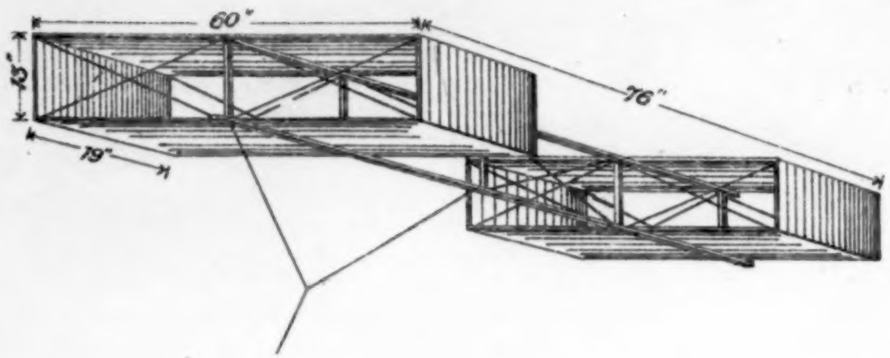


Fig. 58.

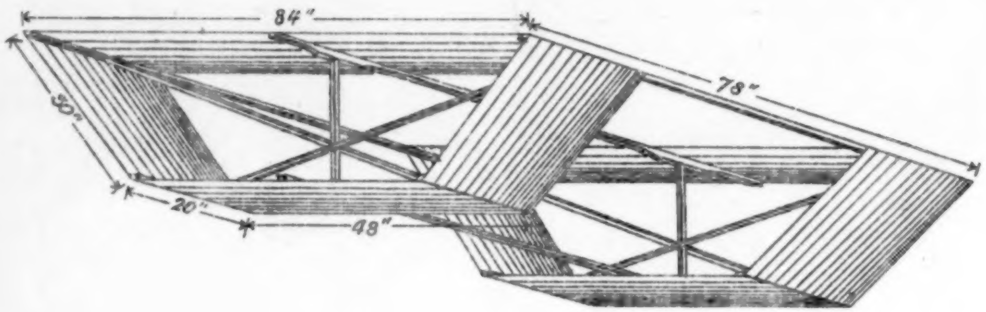
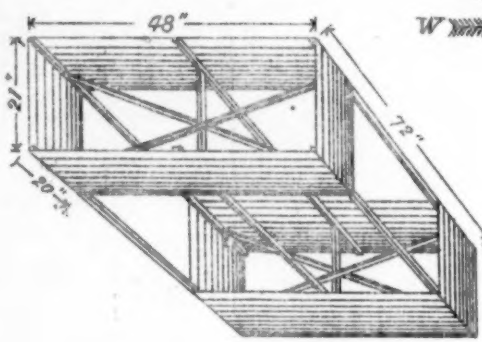


Fig. 59.



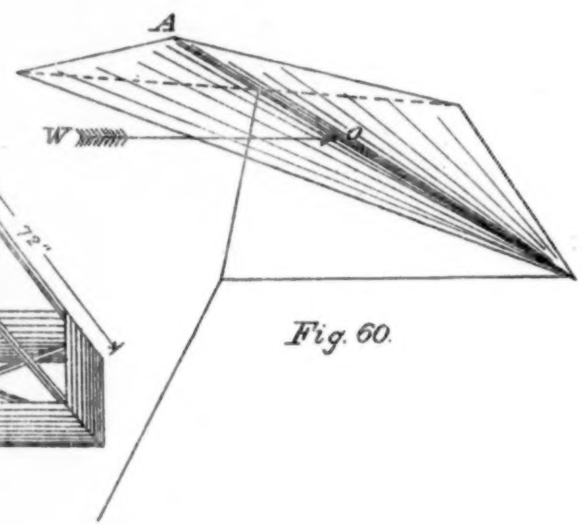


Fig. 60.

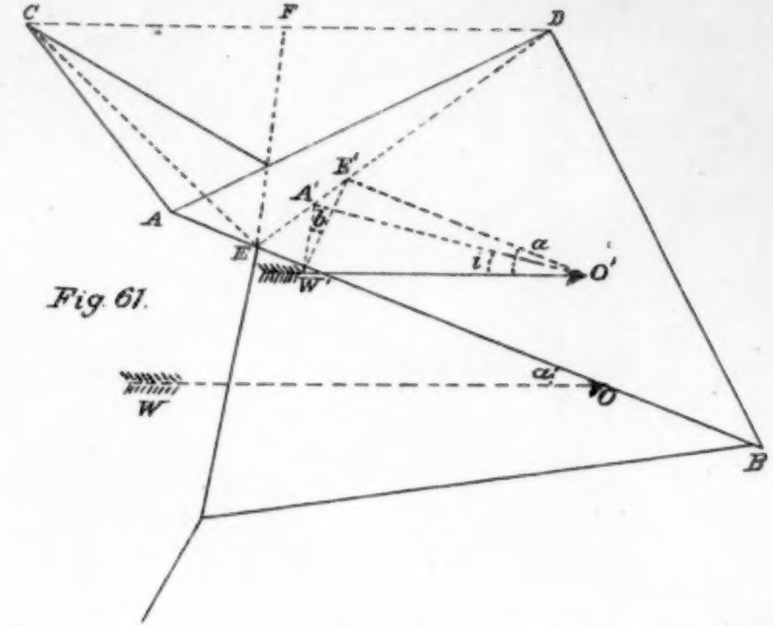


Fig. 61.

Fig. 62.

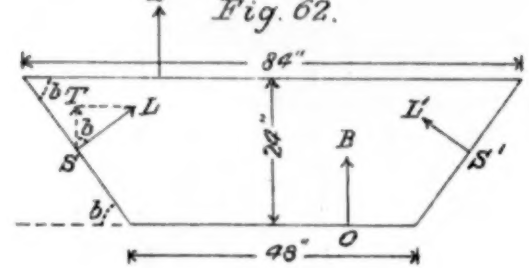


Fig. 63.

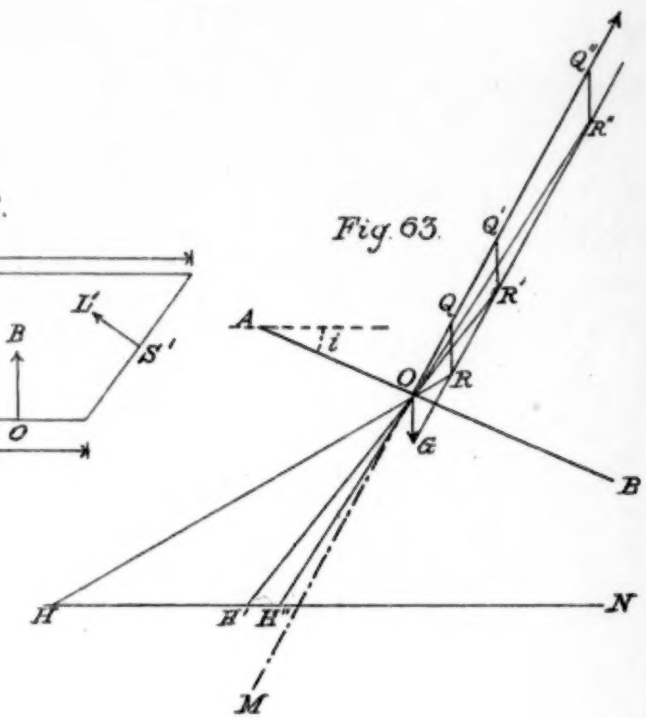


Fig. 64.